Chapter 3 Affected Environment, Environmental Consequences, and Avoidance, Minimization, and/or Mitigation Measures

3.1 Traffic and Transportation/Pedestrian and Bicycle Facilities

3.1.1 Affected Environment

3.1.1.1 EXISTING ROADWAY NETWORK

Highway 101, which is a major north-south route along the western coast of the United States, passes through five Bay Area counties—Sonoma, Marin, San Francisco, San Mateo, and Santa Clara counties. It is the most heavily traveled route in the North Bay Area. In Sonoma County, Highway 101 plays a vital role in intra-county connections and also connects the County with the greater Bay Area.

According to Caltrans, the traffic along Highway 101 in the study corridor on an average day in 2003, represented by annual average daily traffic (AADT), ranged from 94,000 to 103,000 vehicles per day (both directions), as shown in Figure 3.1-1.[1] Immediately north of the Highway 101 / Wilfred Avenue Interchange, traffic volumes exceeded 120,000 vehicles per day (vpd).

The study area, which is illustrated in Figure 3.1-2, includes three full interchanges with important connecting roads: Petaluma Boulevard–Old Redwood Highway, SR 116 (Gravenstein Highway), and Rohnert Park Expressway. Local arterials and streets also serve the study area. The major streets in the study area are described below.

- **Old Redwood Highway** extends in a north-south direction east of Highway 101 through the cities of Petaluma, Cotati and Rohnert Park. It connects Petaluma Boulevard to the south with SR 116 in Cotati to the north. Old Redwood Highway provides two travel lanes in each direction in the cities of Petaluma and Cotati and one travel lane in each direction in unincorporated Sonoma County. It carries an Average Daily Traffic (ADT) volume of approximately 20,400 vpd between West Sierra Avenue–East Cotati Avenue and SR 116.
- **Stony Point Road** extends in a north-south direction west of Highway 101, connecting Petaluma Boulevard in the City of Petaluma to the south and SR 12 in the City of Santa Rosa to the north. Stony Point Road provides one lane of travel in both directions and carries an ADT of approximately 8,500 vpd at Pepper Road.

[1] http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/2003all.htm

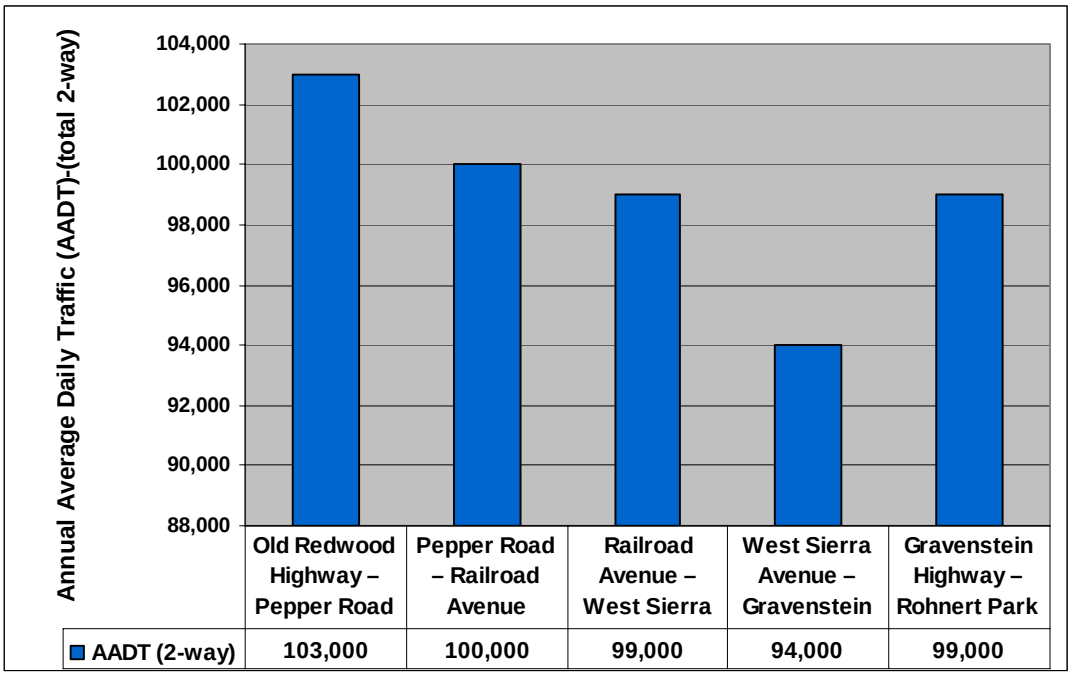


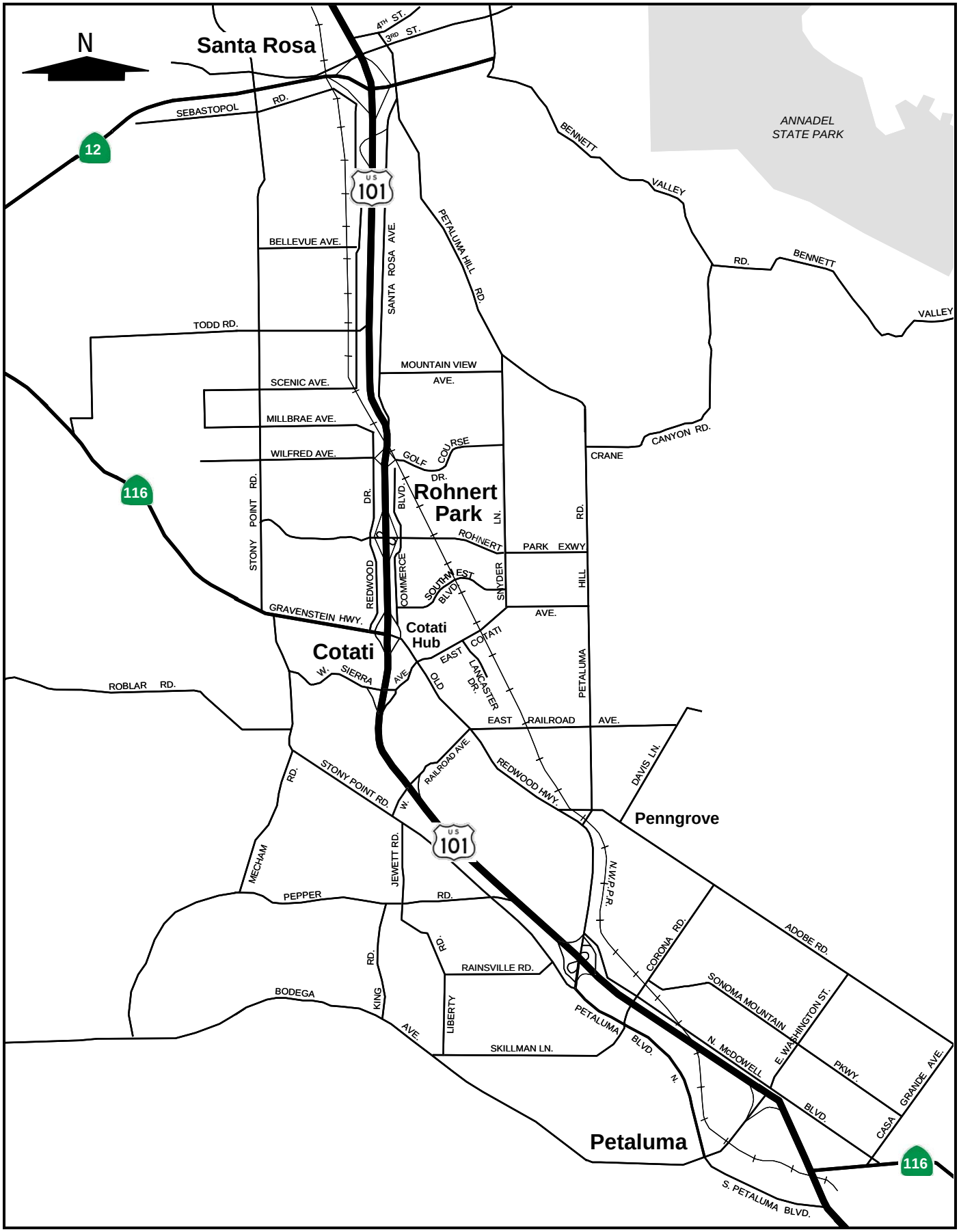
Figure 3.1-1: 2003 Annual Average Daily Traffic Volumes on Highway 101

- **Commerce Boulevard** runs in a north-south direction east of Highway 101 and connects Southwest Boulevard in Cotati to Golf Course Drive in Rohnert Park before turning west and crossing under Highway 101 to Redwood Drive. Commerce Boulevard provides two lanes of traffic in each direction between Enterprise Drive and Rohnert Park Expressway with an ADT of 18,000 vpd in this section.

- **Petaluma Boulevard** runs in a north-south direction starting at the Highway 101/Old Redwood Highway Interchange and re-connecting to Highway 101 south of Petaluma near the Petaluma River. Petaluma Boulevard provides two lanes of traffic in both directions reducing to one lane of traffic in each direction as it crosses to the east of the highway. Average daily traffic at the Highway 101 Interchange is approximately 20,000 vpd.

- **Railroad Avenue** extends in a northeast-southwest direction across Highway 101 through unincorporated Sonoma County, connecting Stony Point Road on the west to Petaluma Hill Road and continuing on to Davis Lane in the unincorporated area of Penngrove on the east. Within the study area, it provides one lane of travel in each direction and has an ADT of approximately 2,200 vpd.

- **West Sierra Avenue–East Cotati Avenue** runs in an east-west direction, crossing Highway 101 and traveling through the Cotati Hub. East of the Hub, it is named East Cotati Avenue and to the west it is West Sierra Avenue. In the study area, most of this street provides one lane of traffic in each direction with two lanes east of Lancaster Drive. Near Old Redwood Highway, the ADT is approximately 14,500 vpd.



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Highway 101 HOV Lane Widening Project: Old Redwood Highway, Petaluma to Rohnert Park Expressway, Rohnert Park

ROADWAY NETWORK WITHIN TRAFFIC STUDY AREA AND VICINITY
Figure 3.1-2

- **Gravenstein Highway (SR 116)** is a state highway that extends in an east-west direction connecting SR 12 in the City of Sebastopol on the west with Old Redwood Highway in the City of Cotati. Within the study area, SR 116 provides two lanes of traffic in each direction and serves approximately 22,750 vpd at its intersection with Highway 101.
- **Southwest Boulevard** extends in an east-west direction from Commerce Boulevard on the west to Snyder Lane on the east. Southwest Boulevard provides two lanes of traffic in each direction to carry approximately 13,100 vpd at Old Redwood Highway.
- **Rohnert Park Expressway** is a main east-west thoroughfare in the City of Rohnert Park and connects Stony Point Road on the west with Petaluma Hill Road on the east. Within the study area, Rohnert Park Expressway provides two lanes of traffic in each direction. At the Highway 101 / Rohnert Park Expressway Interchange, the ADT is approximately 26,300 vpd.

3.1.1.2 EXISTING TRAFFIC CONDITIONS ON HIGHWAY 101

Current peak hour traffic conditions on Highway 101 are discussed in this section. Although the project improvements focus on a 10.3-km (6.4-mi) stretch of Highway 101 from Old Redwood Highway to Rohnert Park Expressway (the project area), the proposed traffic improvements would affect traffic operations beyond these limits. Similarly, traffic conditions outside of the immediate project limits could affect traffic operations within the project area. For example, extremely congested conditions on northbound Highway 101, north of the project area, could build up congestion that extends south into the project area. Such congestion could induce long delays and disrupt the northbound traffic in the project area.

To include these kinds of effects, the traffic studies analyzed the stretch of Highway 101 all the way from Petaluma Boulevard South in Petaluma to Windsor River Road in Windsor. However, this environmental document reports traffic conditions only for the project area and immediate vicinity. This extended project area consists of Highway 101 from the Petaluma Boulevard South Interchange to the Rohnert Park Expressway Interchange, a distance of approximately 18.8 km (11.7 mi), which is referred to in this environmental document, as the "traffic study area".[2] Figure 3.1-3 shows the location of the traffic study area.

Traffic counts for the traffic study area indicate that the morning peak hour for the northbound direction is typically between 8:00 and 9:00 a.m. and for the southbound direction is between 7:00 and 8:00 a.m. At most northbound locations, however, the hourly volumes recorded in the 7:00 to 8:00 a.m. period fall within 90 percent of the peak hour volumes. At most southbound locations, the volumes recorded in the two adjacent hours fall within 80 percent of the peak hour volumes.

[2] The traffic technical memorandum prepared for the project includes a larger "traffic study area" extending from Petaluma Boulevard South in Petaluma to Windsor River Road in Windsor because the traffic studies evaluated the effects of multiple projects.

The evening peak hour typically takes place between 4:00 and 5:00 p.m. for both the northbound and the southbound directions. The evening peak is as mildly pronounced as the morning peak, with volumes only slightly differentiated between 4:00 and 6:00 p.m. Although directional flow is somewhat evenly distributed by time of day, the small differences indicate that commute patterns are slightly more southward in the morning and slightly more northward in the evening. This reflects commute trips from bedroom communities in Sonoma County to jobs in Marin County and farther south.

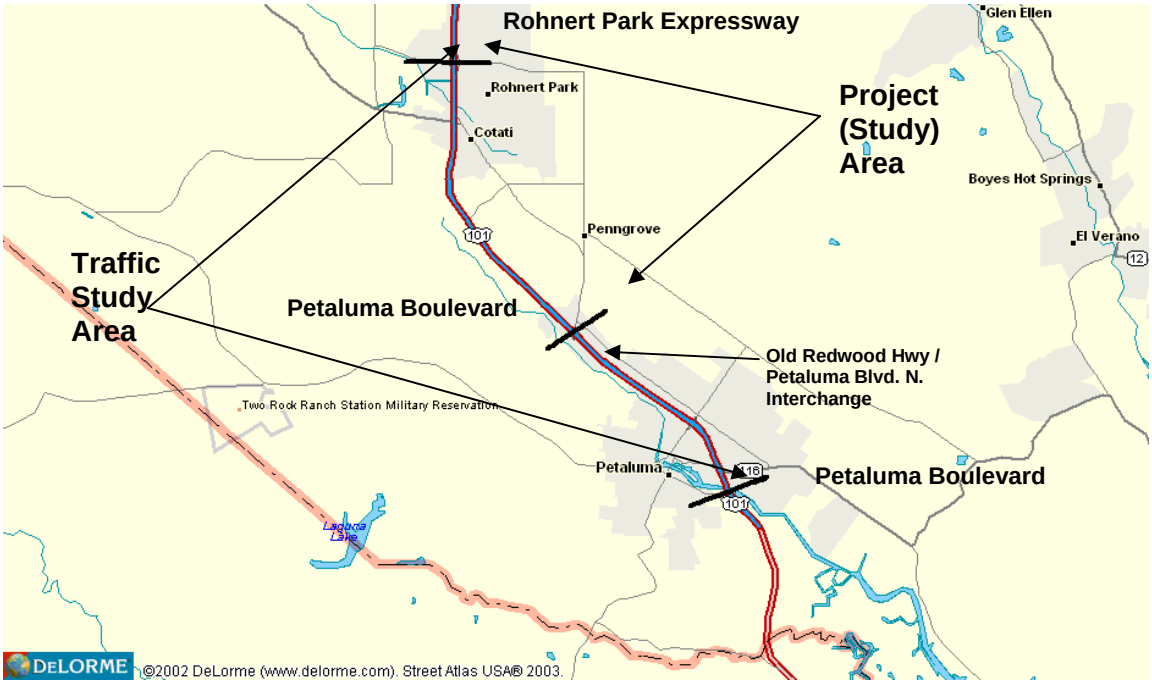


Figure 3.1-3: Traffic Study Area

Current peak-hour travel times on Highway 101 through the traffic study area vary from 11.4 to 18.0 minutes, depending upon the direction and peak hour (morning or evening).

Intersection Analysis

The intersections in the study area are categorized into two groups: signalized (controlled by traffic signals) and unsignalized (controlled by stop signs). SYNCHRO software was used to analyze both kinds of intersections for this study. Based on the operational characteristics of each intersection—mainly the per vehicle delay at each intersection—the intersections were assigned a level of service ranking from LOS "A" to LOS "F". Level of Service or LOS is a measure used to rate roadway facilities, based on their traffic conditions. The level of service criteria for intersection analysis is presented in Table 3.1-1.

The 11 intersections in the study area are listed below. All these intersections except the Pepper Road/Stony Point Road Intersection are Highway 101 ramp intersections with local streets. Only three of the 11 intersections are unsignalized intersections.

1. Old Redwood Highway and 101 northbound
2. Petaluma Boulevard North and 101 southbound
3. Pepper Road and Stony Point Road
4. West Railroad Avenue and 101 northbound (unsignalized)
5. West Sierra Avenue and 101 northbound (unsignalized)
6. West Sierra Avenue and 101 southbound (unsignalized)
7. SR 116 (West) and 101 northbound
8. SR 116 (West) and 101 southbound
9. Commerce Boulevard and 101 northbound
10. Rohnert Park Expressway and 101 northbound
11. Rohnert Park Expressway and 101 southbound

Table 3.1-1: Intersection LOS Definitions

Level of Service (LOS)	General Description	Criteria for Intersections (control delay per vehicle, sec/veh)	
		Unsignalized	Signalized
A	Traffic flows with very little delay and speeds are optimal. Most vehicles do not stop at all.	0-10	< 10
B	Traffic flows with very little delay and speeds may be slightly reduced. Very infrequent and short waits at traffic signals. More vehicles stop at intersections than for LOS A.	> 10-15	> 10-20
C	Traffic speeds continue to slow. Some vehicles may stop at this level, although many vehicles still pass through the intersection without stopping.	> 15-25	> 20-35
D	Congestion becomes more noticeable. Many vehicles stop, and the proportion of vehicles not stopping declines.	> 25-35	> 35-55
E	Low speeds and traffic back ups at intersections. Often considered to be the limit of acceptable delay.	> 35-50	> 55-80
F	Very slow speeds and congestion. Long traffic backups. Very likely to wait for multiple greens to get through an intersection. This is considered to be unacceptable to most drivers.	> 50	> 80

Source: Highway Capacity Manual

The results of the intersection analysis show that all of the 11 intersections are operating at LOS D or better for both the morning and evening peak hours. During the morning peak hour, all intersections operate at LOS C or better, with eight intersections operating at LOS B or better. In the evening peak hour, the Rohnert Park Expressway / Highway 101 (southbound) ramp intersection operates at LOS D. All other intersections operate at LOS C or better. See Table H-3 in Appendix H for more details.

Safety

Accident data for a three-year period from October 1, 2001 to September 30, 2004, the latest three-year period available at the time of the study, were reviewed for both mainline and ramps within the project limits. These data were compared to statewide accident averages for similar facilities. This section summarizes the mainline accidents, actual accident rates, and statewide average rates for the northbound and southbound travel directions within the study area. In both northbound and southbound directions, all but one segment within the project limits had total and injury accident rates near or below the reported average rates for similar facilities.

Highway 101 between the Pepper Road and West Railroad Avenue interchanges was the only segment that had accident rates exceeding statewide average rates for similar facilities. In the southbound direction, the injury and total accident rates were approximately 33 and 39 percent above average rates, respectively. In this same segment in the northbound direction, rates were below average for injury accidents and only slightly above the reported average rates for total accidents.

In both directions along this segment of the highway, and for the project limits as a whole, most of the accidents involved rear-end collisions and hit objects, attributed primarily to speeding, following too close and improper turns. See Figure 3.1-4 and Figure 3.1-5. Weather or unusual roadway conditions did not appear to have contributed significantly to the accident rates in this segment.

One fatal accident was reported on the freeway mainline within the three-year period. This occurred in the southbound direction just south of the Pepper Road on-ramp.

No fatal accidents at ramp locations were reported for this study section during the three-year period. In the southbound direction, accident rates exceed statewide average rates at two locations: the on-ramp from Petaluma Boulevard North, and the on-ramp from Rohnert Park Expressway.

The southbound on-ramp from eastbound Petaluma Boulevard North/Old Redwood Highway had total and injury accident rates over five times and four times reported average rates, respectively. Eighty-five percent of the accidents (six out of seven accidents) were broadside or sideswipe accidents within the ramp/intersection area, primarily due to failure to yield, improper turns or speeding.

The southbound on-ramp from Rohnert Park Expressway had accident rates approximately twice the reported statewide average rates. The majority of accidents (seventy-three percent) were rear end collisions, with sideswipes accounting for a further thirteen percent. These accidents were primarily the result of speeding, following too close or other violations. Ninety-three percent (fourteen out of fifteen) of the accidents occurred at the street intersection.

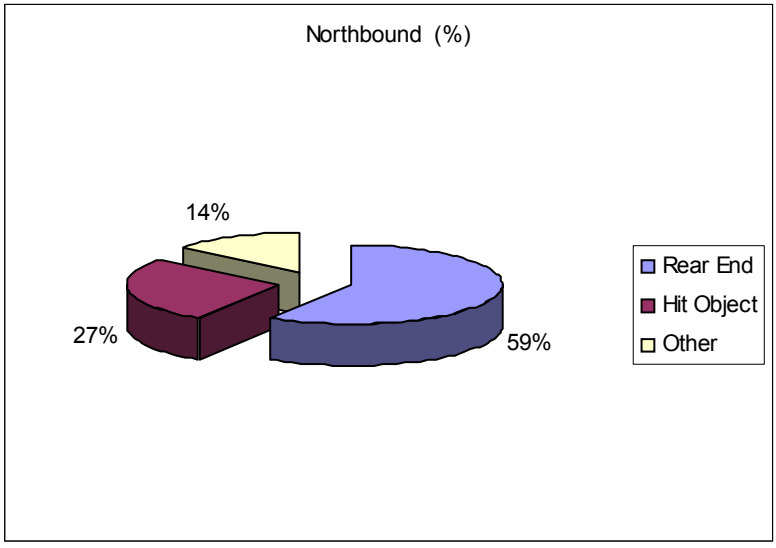


Figure 3.1-4: Percentages of Accidents in the Study Area (Northbound) by Collision Type

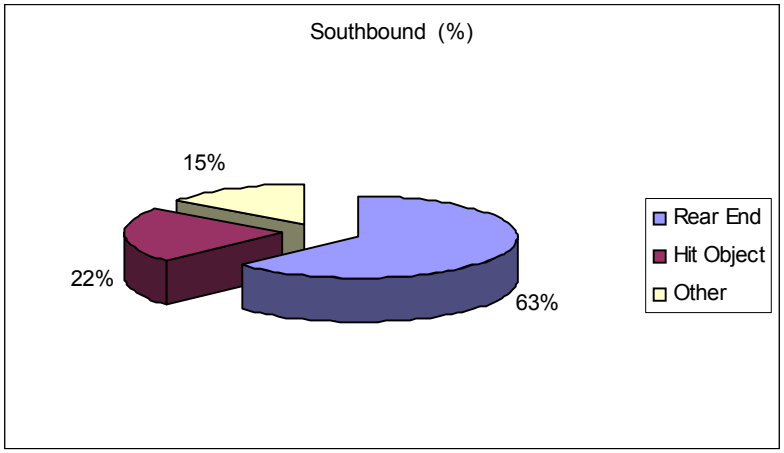


Figure 3.1-5: Percentages of Accidents in the Study Area (Southbound) by Collision Type

In the northbound direction, two of the three on-ramps within the project limits had accident rates exceeding average. At the northbound on-ramp from westbound Petaluma Boulevard, four of the five reported accidents occurred at the intersection with the local street and were primarily rear-end collisions. At the northbound on-ramp from SR 116, the injury accident rate was approximately twice the statewide average, while the total accident rate was approximately 35 percent above average. Four of the total of nine accidents occurred at the intersection with the local street. The types of collision were evenly distributed among sideswipe, rear end, hit object, and overturn. Fifty-six percent of the accidents were due to improper turns.

Accident rates for the northbound off-ramps exceeded statewide average rates at Petaluma Boulevard North/Old Redwood Highway, West Railroad Avenue, and Rohnert Park Expressway. At Petaluma

Boulevard North, eighteen accidents were reported involving a range of collision types. There are no clear trends for collision factors. Although the accident rate at West Railroad Avenue exceeds the statewide average, there were only two accidents reported there, both of which occurred in the intersection area.

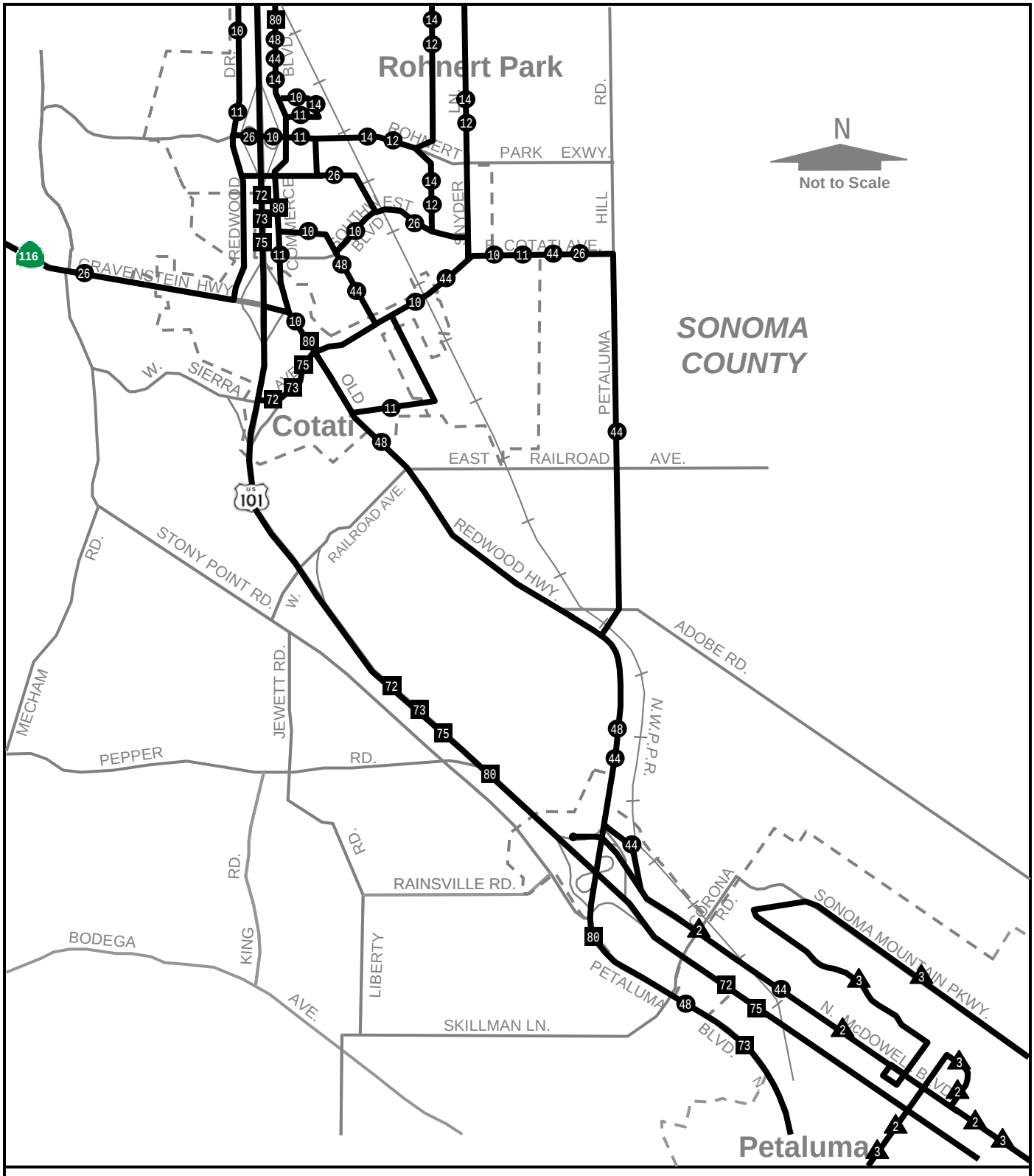
At the northbound off-ramp to Rohnert Park Expressway, the injury and total accident rates were more than three times and six times the reported statewide average rates, respectively. There were a total of 73 accidents at this location, 82 percent of which occurred at the ramp intersection. Sixty-six percent were categorized as broadside accidents and 21 percent were rear end collisions. The high percentage of broadside collisions are likely attributable to the addition of a signal at the ramp terminus, during a recent conversion of the interchange from a diamond interchange to a partial cloverleaf configuration.

3.1.1.3 EXISTING TRANSIT, BICYCLE/PEDESTRIAN, AND PARKING CONDITIONS

Transit Services

Transit services in the traffic study area are provided by Sonoma County Transit, Golden Gate Transit, and Petaluma Transit. Bus routes in the vicinity of the traffic study area are shown in Figure 3.1-6

- **Sonoma County Transit**. Sonoma County Transit operates a total of 24 bus routes, including six local and three express routes throughout Sonoma County. Coverage of the seven bus routes in the study area includes Rohnert Park City Hall, Rohnert Park Library, El Camino High School, and Mountain Shadows Middle School.
- **Golden Gate Transit.** Golden Gate Transit's 52 bus routes serve cities in Marin County and parts of Sonoma, San Francisco and Contra Costa counties, including the cities of Petaluma, Cotati and Rohnert Park. Five bus routes serve the study area between Petaluma and Rohnert Park, mostly traveling along Highway 101.
- **Petaluma Transit.** Petaluma Transit operates four bus routes for the City of Petaluma, one of which operates within the southern portion of the study area along McDowell Boulevard in Petaluma.



Legend:

- Sonoma County Transit
- Golden Gate Transit
- Petaluma Transit
- City Boundary
- Railroad

Source: Sonoma County Transit, Golden Gate Transit and Petaluma Transit

Highway 101 HOV Lane Widening Project: Old Redwood Highway, Petaluma to Rohnert Park Expressway, Rohnert Park

BUS ROUTES IN THE STUDY AREA
Figure 3.1-6

Pedestrian Facilities

According to the Sonoma County Transportation and Land Use Coalition, the number of people who commute by bicycling or walking in Sonoma County is low. In 2003, bikes were used for only about 1.7 percent of commute trips, while the percentage of commute trips made by walking was 3.1. Major pedestrian activity centers within half a mile of the interchanges in the study area are shown in Figure 3.1-7. These activity centers include houses of worship, schools, colleges, governmental facilities, and shopping centers. Walkways and cross paths are provided on many streets near the interchanges, but these facilities are not continuous on all streets. All the interchanges in the study area except at Railroad Avenue and the Highway 101/SR 116 Interchange have pedestrian walkways at the interchange overcrossing or undercrossing.

Bicycle Facilities

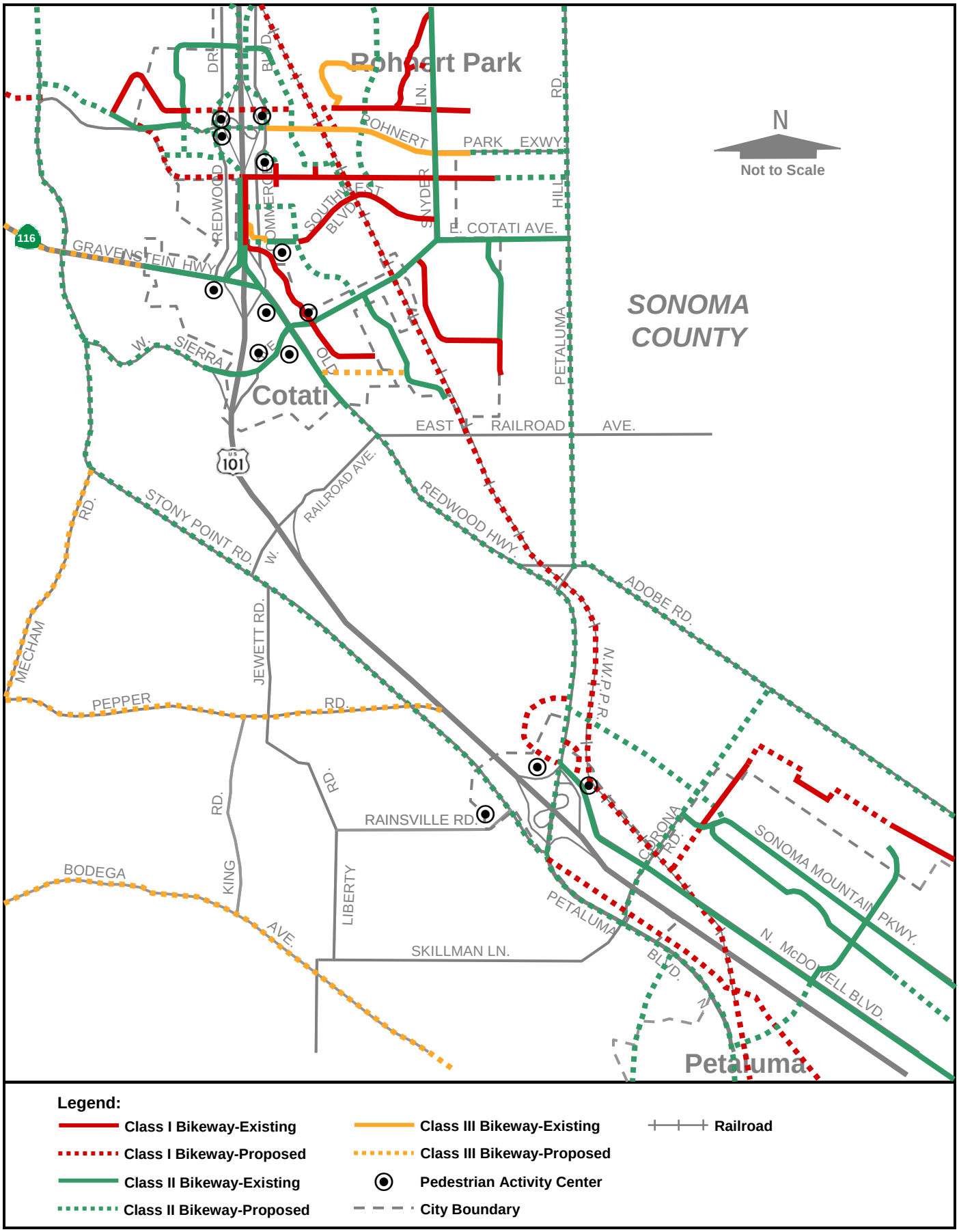
The *Sonoma County Transportation Authority (SCTA) Countywide Bicycle Plan Update* is the countywide planning document for bicycle facilities. The primary goal of the plan is to create a countywide non-motorized transportation system that provides safe and efficient opportunities for bicyclists to access school, work, shopping centers, professional services, and transportation to recreation areas. Bicycle facilities may also serve as recreational paths themselves. Currently there are over 53 km (33 mi) of off-road (Class I) bike paths and 103 km (64 mi) of on-street (Class II) bike lanes in Sonoma County. Bikeway classifications are defined in Table 3.1-2, below.

Table 3.1-2: Bikeway Classifications

Bikeway Class	Definition
Class I Bikeway (Bike Path)	Provides a completely separated right of way for the exclusive use of bicycles and pedestrians with crossflow minimized.
Class II Bikeway (Bike Lane)	Provides a striped land for one-way bike travel on a street or highway.
Class III Bikeway (Bike Route)	Provides for shared use with pedestrian or motor vehicle traffic.
Source: Caltrans Highway Design Manual, July 1995.	

Existing and planned bicycle facilities in the study area are shown in Figure 3.1-7. Class I bike paths in the study area include the Laguna de Santa Rosa and Marsh Way bike paths in the Rohnert Park and Cotati areas, and the Southwest Boulevard and Copeland Creek bike paths in Rohnert Park. There are several Class II bikeways in the study area, including those on Old Redwood Highway, East Cotati-West Sierra Avenue, and Redwood Drive near Highway 101, from Copeland Creek to Gravenstein Highway in Cotati. The Highway 101/West Sierra Avenue intersection currently has an on-street bikeway facility (Class II) at the undercrossing.

Proposed bikeway facilities (by others) in the study area include a Class I bike path on Commerce Boulevard in Rohnert Park, between Rohnert Park Expressway and State Farm Drive, and Class II and III bikeway facilities on Highway 116, between Cotati and Sebastopol.



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Highway 101 HOV Lane Widening Project:
Old Redwood Highway, Petaluma to
Rohnert Park Expressway, Rohnert Park

BICYCLE ROUTES AND PEDESTRIAN ACTIVITY CENTERS
Figure 3.1-7

Parking

A total of about 945 parking spaces are available at locations adjacent to Highway 101 along the study corridor, including shopping centers, industrial complexes, commercial establishments and two park-and-ride lots. Table 3.1-3 summarizes current off-street parking in the project vicinity that has some potential to be affected by the proposed project.

Table 3.1-3: Potentially Affected Parking in the Study Area

Location	Total Parking Spaces[1]
Cattleman's Restaurant	210
Quality Inn	110
Crikos Trucking Company	40
Park-and-Ride Lot (Cotati)	180
Showcase of Motorcars	80
Sonoma Joe's Casino and Restaurant	130
Park-and-Ride Lot (Rohnert Park)	110
Redwood Reliance Sales	85
Total	**945**

[1] Estimate of existing parking based on a review of aerial mapping.

Source: Parsons 2004

3.1.2 Environmental Consequences

The following sections report anticipated traffic and transportation effects of the No-Build and Build Alternatives. See the *Revised Draft Traffic Operational Analysis–Traffic Operational Memorandum,* for information on the travel demand modeling and operational analysis, including data on freeway level of service, queues, and bottlenecks, which are not included in this section. The Build Alternative is the proposed Highway 101 HOV Lane Widening Project. The No-Build Alternative includes all currently planned and/or programmed improvements except the proposed project. The No-Build Alternative therefore assumes that the Marin/Sonoma Narrows, Steele Lane to Windsor River Road, Rohnert Park Expressway to Santa Rosa Avenue, including Wilfred Avenue Interchange, and Highway 12 to Steele Lane HOV Lane widening projects (depicted in Figure 1.1-3 and discussed in Section 1.3.3, Related Projects) would all be in place by 2030. The Build Alternative analysis evaluates the effects of the present project in addition to No-Build conditions.

3.1.2.1 2030 Peak Hour Traffic Conditions Under the No-Build Alternative

By 2030, without capacity and operational improvements on Highway 101, traffic conditions on the freeway and at the intersections near the freeway would deteriorate. The percentage of peak-hour travel demand that could be accommodated by the freeway through the study area would decrease, leading to lower travel speeds, greater travel times, and delays. Congested traffic conditions would

disrupt traffic flow. See Tables H-4 and H-5 in Appendix H for detailed tabulations of the information presented in the following paragraphs.

Travel Time

Congestion creates increased travel times through the 11.7-mile traffic study area, compared with 'free-flow' (no delay) travel time of 10.8 minutes. Without capacity and operational improvements on Highway 101, travel times through the traffic study area in 2030 would vary from 17.0 to 24.8 minutes for mixed-flow lane users and 17.0 to 19.6 minutes for HOV lane eligible users, based on direction and peak hour (Table 3.1-4). Travel times would be highest in the northbound direction, amounting to 22.4 and 24.8 minutes for mixed-flow lanes and 19.2 to 19.6 for HOV lane eligible users in the morning and evening peak hours, respectively. Travel times in southbound direction would be somewhat better, about 18.4 and 17.0 minutes respectively, in the morning and evening peak hours, for both mixed-flow lane users and HOV lane eligible users.

Table 3.1-4: Estimated Travel Time, Delay, and Time Savings in 2030 (minutes)

	Southbound				Northbound			
	AM		PM		AM		PM	
Alternative	M-Flow	HOV	M-Flow	HOV	M-Flow	HOV	M-Flow	HOV
	Travel Time							
No Build	18.4	18.4	17.0	17.0	22.4	19.2	24.8	19.6
Build	11.8	11.8	11.8	11.8	16.6	11.9	14.4	12.0
Savings	6.6	6.5	5.3	5.2	5.8	7.3	10.4	7.6
	Delay							
No Build	7.6	7.6	5.8	5.8	11.3	8.2	13.7	8.5
Build	0.9	1.0*	0.9	1.0*	5.6	1.0	3.4	1.0
Savings	6.6	6.6	4.9	4.8	5.7	7.2	10.3	7.5

* Increases in southbound HOV delay, when compared to mixed-flow delay, range from 1 to 3 seconds and are not substantial. The HOV lanes provide enough added southbound capacity to prevent congestion from developing.

Note: Numbers might not add up due to rounding.

Source: Parsons 2005.

Delay

Increasing traffic demand and decreasing speeds translate into delay. See Figure 1.2-2 for delay locations. The location of worst delays and lowest speeds in the project area in 2030 is projected to be from the East Washington Street on-ramp to the top of the Cotati Grade, which ends just before the West Sierra Avenue off-ramp. This congested condition appears to result from a combination of merge problems at the Old Redwood Highway-Petaluma Boulevard North Interchange and the three percent grade, which reduces the effective capacity of the freeway in this segment. As shown by Table 3.1-4, delay would be highest in the northbound direction, amounting to 11.3 and 13.7 minutes for mixed-flow lane users and 8.2 to 8.5 minutes for HOV lane eligible users in the morning and evening peak hours, respectively. The delay in the southbound direction would be 7.6 and 5.8 minutes respectively, in the morning and evening peak hours, for both mixed-flow lane users and HOV lane eligible users.

Intersection Analysis

Intersection geometry within the project limits under the No-Build Alternative would remain the same as the existing intersection geometry. Details of intersection analysis results are presented in Table H-6 in Appendix H. Under no-build conditions in 2030, all intersections would operate at LOS D or better except at the following locations:

- Petaluma Boulevard North and Highway 101 southbound off/on-ramp
- West Sierra Avenue and Highway 101 southbound on-ramp
- SR 116 (West) and Highway 101 southbound on/off ramps
- Old Redwood Highway and Commerce Boulevard-SR-116 northbound on-ramp

The Petaluma Boulevard North and Highway 101 southbound off/on-ramp would operate at LOS E during the morning peak hour. The SR 116 (West) and Highway 101 southbound on/off ramps would operate at LOS F during the evening peak hour. The remaining two intersections would operate at LOS F during both the morning and evening peak hours.

3.1.2.2 2030 Transit Conditions Under the No-Build Alternative

Without the proposed HOV lane widening and related improvements, peak-period transit operations within the traffic study area would experience similar congestion and delay conditions as described for no-build traffic operations in 2030. Problem locations along the freeway mainline and at intersections would be as described in Section 3.1.2.1, 2030 Peak Hour Traffic Conditions under the No-Build Alternative.

3.1.2.3 Bicycle/Pedestrian and Parking Conditions Under the No-Build Alternative

No substantial adverse impacts to bicycle, pedestrian, and parking conditions within the Highway 101 HOV Lane Widening Project area are anticipated as a result of the No-Build Alternative.

3.1.2.4 2010 Peak Hour Traffic Conditions Under the No-Build and Build Alternatives

The Build Alternative is anticipated to operate at acceptable levels of service in 2010 and would operate better than the No-Build Alternative. Heavy growth within the Highway 101 corridor occurs between 2003 and 2010, increasing traffic volumes within the project limits between 7 and 72 percent depending upon direction and peak hour. The Build Alternative would reduce congestion substantially in the following locations:

- Old Redwood Highway-Petaluma Boulevard North to Railroad Avenue in the northbound direction in the morning peak hour;
- Old Redwood Highway-Petaluma Boulevard North to West Sierra Avenue in the northbound direction in the evening peak hour; and
- Pepper Road to Rohnert Park Expressway in the southbound direction in the morning and evening peak hours.

Congested conditions would develop in the southbound direction approaching Petaluma Boulevard South in both the morning and evening peak hours under both the Build and No-Build alternatives because the "Narrows" section south of Petaluma Boulevard South is constrained.

Under the Build Alternative, the HOV lanes combined with the northbound climbing lane provide enough added capacity within the project limits to substantially reduce the northbound and southbound congestion on Cotati Grade listed above. Reduction of congestion at these locations, especially the locations on southbound Highway 101, results in substantial reduction in delay for both HOV and mixed-flow lane users when compared to the No-Build Alternative.

3.1.2.5 2030 PEAK HOUR TRAFFIC CONDITIONS UNDER THE BUILD ALTERNATIVE

The Build Alternative would widen the Highway 101 median to provide HOV lanes in each direction and widen the outside of the highway to provide standard shoulders. Auxiliary lanes would be added between the SR 116 (Gravenstein Highway) and Rohnert Park Expressway ramps to improve operations as traffic enters and exits Highway 101 from those interchanges. A climbing lane would be constructed in the northbound direction between Old Redwood Highway and West Sierra Avenue to separate slow-moving vehicles from faster-moving traffic up the Cotati Grade.

While these new facilities would substantially improve traffic operations on Highway 101, especially in the near term, the Build Alternative would not eliminate all of the operational problems that would occur in the study area by 2030. Some mainline segments would be expected to deteriorate in level of service as a result of congested conditions outside of the project area. The next subsection defines the Sonoma County standards that would apply to these impacts, while the following subsections describe anticipated conditions under the Build Alternative.

Applicable Traffic and Parking Impact Standards

The County's criteria for determining traffic impacts are as follows:

- Vehicle Queues: The 95th percentile queue length exceeds the turn lane storage capacity;
- Signal Warrants: Conditions change to cause an intersection to meet or exceed Caltrans signal warrant criteria;
- Turn Lanes: Traffic volumes increase to a level that meets or exceeds warrants for providing a turn lane on an intersection approach.
- Sight Distance: An intersection is created or traffic is added to an existing intersection approach that has inadequate sight distance based on Caltrans criteria;
- County Signalized Intersection: A signalized intersection is projected to operate at LOS "E" or "F" as a result of the project or an intersection that would otherwise operate at LOS "E" or "F" and the project results in increased delay of 7.5 seconds or more (LOS "E") or 5.0 seconds or more (LOS "F").

- County Unsignalized Intersections: An un-signalized or all-way stop controlled intersection as a result of the project or an intersection that would otherwise operate at LOS "E" or "F" is projected to operate at LOS "E" or "F" and the project results in increased delay of five seconds or more, except that this criteria does not apply to low volume roadways.
- Parking. For restaurant parking, one space is required for every 2.5 seats. Reduction below this minimum standard could constitute an impact.

The Build Alternative would generally improve traffic operations on Highway 101 in the traffic study area. Although the Build Alternative would improve traffic operations for both mixed-flow and HOV lane vehicles, operational improvements would be much greater for the HOV lane traffic, which would operate at or near free flow speeds, even during peak hours. As shown in the following paragraphs, the proposed project would enhance the ability of Highway 101 to improve travel speeds and shorten travel times. See Tables H-4 and H-5 in Appendix H for detailed tabulations of the information presented in the following paragraphs. These paragraphs discuss the effects of the improvements separately for both the HOV lanes and mixed-flow lanes. The delay savings subsection below also presents the reduction in delay for the mixed flow lanes.

Effect of Climbing Lane on Cotati Grade

Between the Petaluma Boulevard North off-ramp and the top of the Cotati Grade just before West Sierra Avenue, there would be a 26 percent improvement in the ability to meet future demand in the evening northbound direction and a 14 percent increase in the morning northbound direction. The ability to serve more traffic under the Build Alternative would be due to the ramp improvements at the Old Redwood Highway-Petaluma Boulevard North Interchange, and the new climbing lane on Cotati Grade, in addition to the HOV lane. The congestion and delay at this location would be considerably reduced during the morning and evening peak hours. (See the section below, 'Travel Speeds', for further discussion of delay on Northbound Highway 101.)

The Build Alternative analysis shows that the addition of an HOV and a climbing lane along Cotati Grade improves operations compared to the No-Build Alternative by reducing the densities, raising travel speed, shortening the congestion from the East Washington Street interchange to the Petaluma Boulevard North Interchange, and reducing travel time and delay more than 7.2 minutes in the morning peak hour. In the Build Alternative, the HOV lanes would operate at uncongested conditions in the morning and evening peak hours. Travel time and delay would be reduced for HOV lane eligible users by 0.8 minutes in the morning peak hour and 1.9 minutes in the evening peak hour compared to mixed-flow travel. Thus a benefit is provided for HOV users while making substantial reductions in delay for mixed-flow users. However, operations in the mixed-flow lanes along Cotati Grade, even with a climbing lane and HOV lane, would reach effective capacity under the Build Alternative, indicating that a climbing lane and an HOV lane are necessary to help alleviate severe traffic congestion on Cotati Grade.

Travel Time

Under the Build Alternative, as shown in Table 3.1-4 and Figure 3.1-8, the travel time through the traffic study area would shorten to between 11.8 and 16.6 minutes, depending on the direction and peak hour. In comparison, travel times through the traffic study area under no-build conditions would vary between 17.0 and 24.8 minutes for mixed-flow lane users and 17.0 and 19.6 for HOV lane eligible users. This translates to a 26 to 42 percent reduction in travel times for mixed-flow users and a 31 to 39 percent reduction for HOV lane users.

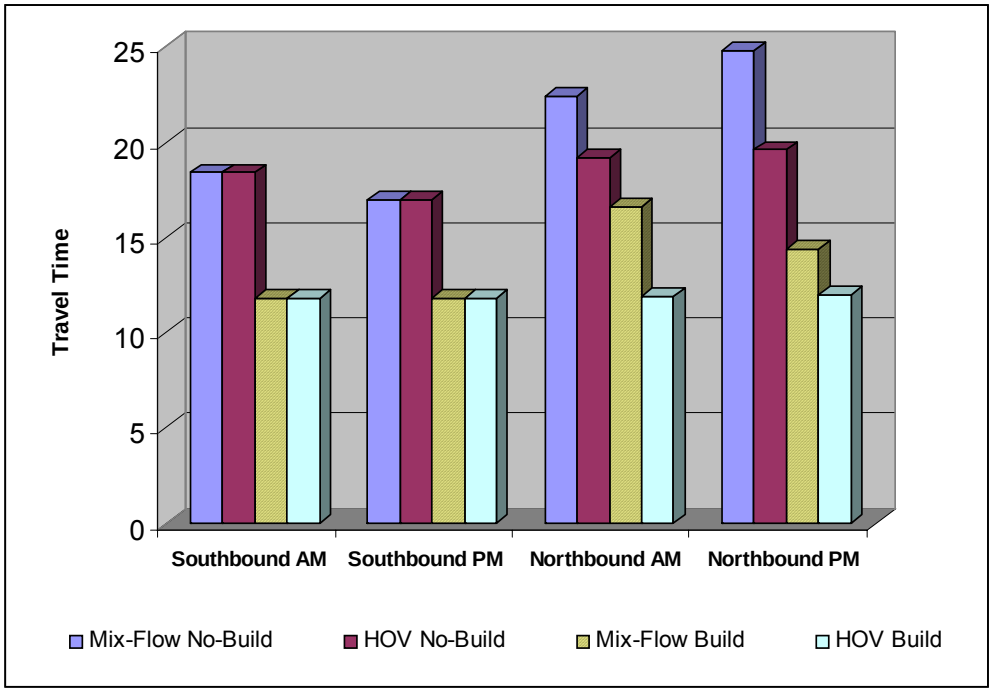


Figure 3.1-8: Travel Times through Traffic Study Area under Build and No-Build Alternatives

Average travel time in the HOV lanes in the traffic study area under the Build Alternative would be 12 minutes for both peak hours and directions. Thus, the potential travel time savings for a motorist who switches from driving in a mixed-flow lane (drive-alone) to an HOV lane (carpool of two or more) under the Build Alternative would be as much as five minutes within the traffic study area. Maximum HOV time savings in the entire corridor from Windsor to Petaluma, of which this project would be the final segment, would be around 11.5 minutes.

The potential travel time savings for a motorist who switches from driving in a mixed-flow lane under the No-Build to the HOV lane under the Build Alternative would vary between five and 13 minutes.

Delay

Figure 3.1-9 shows the total delay within the traffic study area for both alternatives. The shaded areas in the graph show locations of traffic congestion. The Build Alternative would reduce peak-hour delay at some congested locations by over 90 percent. It would reduce delay for mixed-flow lane motorists in the traffic study area by 4.9 to 10.3 minutes, a 51 to 87 percent reduction. HOV users would experience a delay reduction from 4.8 to 7.5 minutes, or 83 to 88 percent, depending on the peak hour and direction (Table 3.1-4).

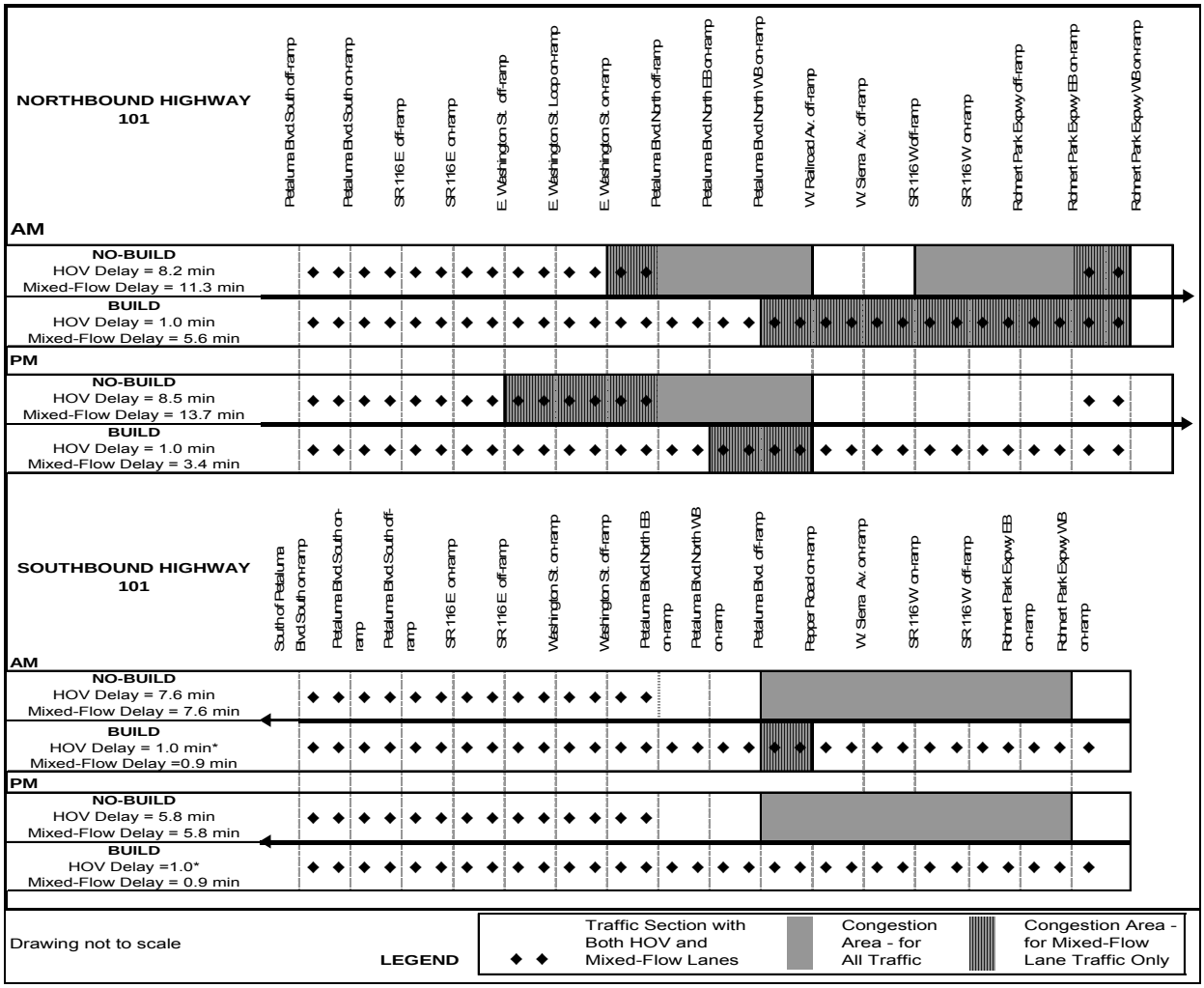


Figure 3.1-9: Total Delay and Locations of Traffic Congestion within Traffic Study Area under Build and No-Build Alternatives in 2030

Note:
- HOV lanes shown outside the proposed project limits under the No-Build Alternative are those created by the related projects described in Section 1.3.3, Related Projects
- *Under the Build Alternative, increases in southbound HOV delay (when compared to mixed-flow delay), range from 1 to 3 seconds and are not material. The HOV lanes provide enough added southbound capacity to prevent congestion from developing.)

The location of the worst delays was projected to be from the East Washington Street on-ramp to the top of the Cotati Grade, which ends just before the West Sierra Avenue off-ramp. Construction of the HOV lane, interchange ramp improvements at Petaluma Boulevard North, and a climbing lane on the Cotati Grade would result in an 88 to 91 percent reduction in delay for HOV lane users and a 79 to 91 percent reduction in delay for mixed-flow motorists at this location.

Intersection Analysis

Under the No-Build Alternative, where intersection geometry within the project limits would be the same as the existing intersection geometry, all but four intersections would operate at LOS D or better. Under the Build Alternative in 2030, all intersections within the project limits would operate at LOS C or better with proposed improvements except the intersection at SR 116 West and Old Redwood Highway, which would operate at LOS D, just over the border between LOS C and D. Although this intersection was not analyzed under No-Build conditions, the improved conditions at adjacent intersections at this interchange suggest that this level of service represents an improvement over No-Build conditions and therefore does not constitute an adverse impact. See Table H-7 in Appendix H for detailed intersection analysis results.

Traffic on Local Streets, VHT, and VMT

Traffic diversions to local streets near congested locations on the freeway are common and can cause considerable delay. By 2030, as congestion on the freeway increases, traffic diversion to local streets, such as Old Redwood Highway, would also increase. This increase in "cut-through" traffic would deteriorate conditions on local streets, increasing delay and energy consumption. The Build Alternative would substantially reduce congestion at some of the congested areas, including the segment between the Old Redwood Highway-Petaluma Boulevard North and Railroad Avenue interchanges, and reduce delay through the traffic study area, providing incentive for commuter and through-traffic to remain on the freeway, freeing arterials and other local streets to serve local traffic.

When there is congestion, vehicles spend more time on a roadway and the vehicle hours of travel (VHT) increase compared to less congested conditions. When vehicles attempt to circumvent freeway congestion by using local roads, the vehicle miles of travel (VMT) increases. Under the Build Alternative, annual countywide VMT would decrease by 31 million kilometers (19 million miles) and annual countywide VHT would decrease by two million hours compared to the No-Build Alternative. These improvements reflect improved travel conditions and a reduction in freeway traffic diversion onto local streets in the traffic study area with the Build Alternative.

3.1.2.6 2030 TRANSIT, BICYCLE/PEDESTRIAN, AND PARKING CONDITIONS UNDER THE BUILD ALTERNATIVE

Transit and Carpooling Conditions

The HOV lanes provided under the Build Alternative would offer dedicated peak hour capacity and a high level of traffic service to transit and carpool vehicles. This would substantially improve travel times for intercity buses and carpooling commuters, as shown in Table 3.1-4. Not only would transit travel time be reduced but transit schedule reliability would be improved. Carpools and vanpools also would have improved speeds and reduced travel times. The improved speeds and schedule reliability would work as incentives for commuters and other travelers to carpool and/or take advantage of local and express buses that would move freely along the HOV lanes. HOV lanes would support an increase in express bus service from Sonoma County to San Francisco, recommended in the *2002 HOV Lane Master Plan* (Metropolitan Transportation Commission, 2003), offering faster and more frequent peak-hour transit service for commuters between Sonoma County and downtown San Francisco.

Pedestrian Facilities

It is expected that the safety and accessibility of the Highway 101 corridor and adjacent roadway network for both pedestrians and bicyclists would generally be facilitated by the improvements under the Build Alternative. Existing pedestrian activity centers and pedestrian facilities near the study area interchanges are described in Section 3.1.1.3, Pedestrian Facilities. The proposed project would not directly improve existing pedestrian structures in the study area, except at the SR 116/Highway 101 Interchange, where the existing structure would be replaced under Interchange Option B. Americans with Disabilities Act (ADA) compliant pedestrian facilities would be provided beneath the new structure.

At all the other interchanges, the Build Alternative would maintain the existing pedestrian facilities. If the project would affect existing pedestrian facilities, the pedestrian facilities would be replaced and the new facilities would be made ADA compliant. Similarly, if any changes are needed to the local streets that would affect the walkways or crosswalks in the street, the walkways and crosswalks would be replaced. In addition, the project would signalize the West Sierra Avenue–southbound Highway 101 ramp intersection, which would help pedestrian movement.

Another structure to be replaced in the project area, though not near a major interchange, would be the existing Railroad Avenue Undercrossing. At present, this undercrossing does not have any pedestrian walkways. When the new structure is built, room would be provided for future pedestrian walkways to be provided by others.

Bicycle Facilities

It is expected that safety and accessibility for both pedestrian and bicyclists would generally be improved as a result of the improvements under the Build Alternative. The project is not expected to affect existing bike paths, and if any changes are needed, the bike paths would be replaced.

In addition, the project proposes to replace the existing Railroad Avenue Undercrossing. When the new structure is built, a 2.4 m (7.9 ft) wide stretch on either side of the road would be set aside for future bike lanes to be provided by others.

Parking

As reported in Table 3.1-5, it is estimated that 35 parking spaces within the right-of-way would be removed for the Build Alternative. Approximately 14 percent of the parking (30 spaces) would be removed from the Cattlemen's restaurant in the southwest corner of the Highway 101/Old Redwood Highway Interchange. Approximately five parking spaces would be removed from the Sonoma Joe's Casino and Restaurant in the northeast corner of the Highway 101/Old Redwood Highway Interchange. The remaining parking spaces at both establishments would still be above the minimum parking requirements set by the City of Petaluma.

Table 3.1-5: Projected Parking Spaces Removed by Project in the Study Area

Location	Total Parking Spaces	Projected Spaces Removed
Cattlemen's Restaurant	210	30
Sonoma Joe's Casino and Restaurant	130	5
Total	340	35

Source: Parsons 2005

3.1.3 Avoidance, Minimization, and/or Mitigation Measures

Impacts on traffic under the Build Alternative would be generally beneficial and therefore no additional project modifications are needed. The proposed project would also not have adverse impacts on pedestrian or bicycle facilities. If pedestrian or bicycle facilities would be displaced or interrupted by project construction, they would be replaced. Also, room would be provided for future pedestrian and bicycle facilities (to be provided by others) when the Railroad Avenue Undercrossing is replaced.

The Build Alternative would reduce parking at Cattlemen's Restaurant and Sonoma Joe's Casino and Restaurant, but not below parking standards of the City of Petaluma; no compensation measures are therefore proposed.

3.2 Land Use, Planning, and Growth

3.2.1 Existing and Future Land Use

3.2.1.1 AFFECTED ENVIRONMENT

Existing land uses in the vicinity of the Highway 101 HOV Lane Widening Project are primarily rural and agricultural, with single- and multi-family residential, commercial and industrial land uses near city centers. These land uses are described from south to north below and shown in Figure 3.2-1.

In the southern segment of the Highway 101 corridor, from the southern project limit to the Highway 101/Petaluma Boulevard–Old Redwood Highway Interchange in Petaluma, existing land use is mostly commercial. The Petaluma Auto Mall is located southwest of the interchange.

Open space is the predominant land use between the Highway 101/Petaluma Boulevard–Old Redwood Highway and Highway 101/West Railroad Avenue interchanges. Residential and commercial uses are on both sides of Highway 101, north of Petaluma Boulevard. A golf driving range and a Quality Inn Motel are located northwest and northeast of the Highway 101/Petaluma Boulevard—Old Redwood Highway Interchange, respectively. The Leisure Lake Mobile Home Park is located adjacent to and west of Highway 101, north of the driving range.

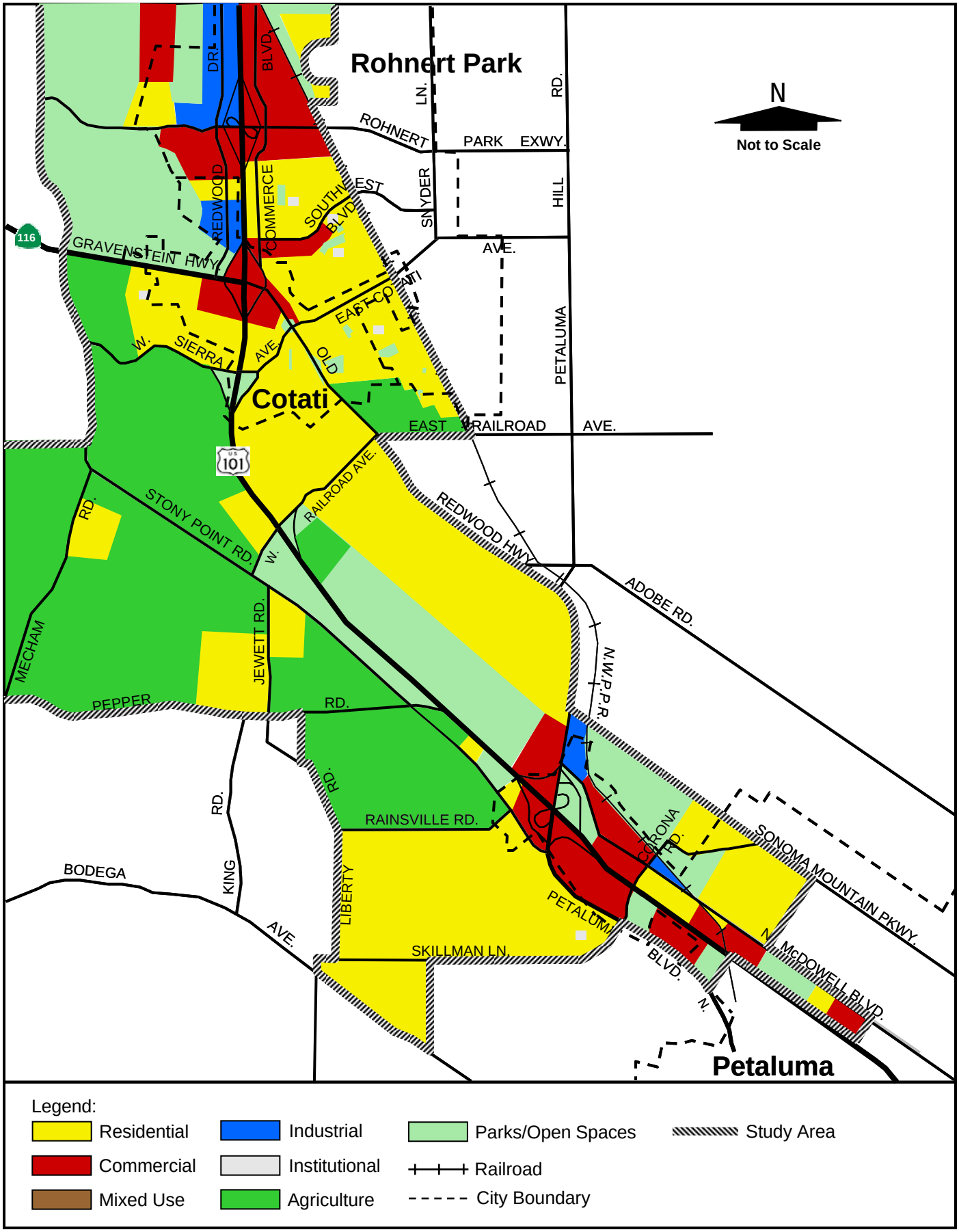
Agricultural uses and single-family residential properties are located along both sides of Highway 101 between West Railroad Avenue and the Highway 101/West Sierra Avenue Interchange. The Sierra Mobile Home Park is located southeast of the Highway 101/West Sierra Avenue Interchange.

Single-family residences predominate between West Sierra Avenue and Gravenstein Highway (SR 116). Light industrial uses are located northwest of the Highway 101/West Sierra Avenue Interchange. A park-and-ride lot is located southeast of the Highway 101/SR 116 Interchange.

On the west side of Highway 101, between SR 116 and the northern project limit at Rohnert Park Expressway, land uses are predominately commercial and industrial. Single-family residential uses predominate on the east side of the highway. The Rancho Feliz Mobile Home Community and a park-and-ride lot are located southwest of the Highway 101/Rohnert Park Expressway Interchange. The Rohnert Park City Hall is located southeast of the interchange. A new park-and-ride lot is currently under construction in the northeast quadrant of the interchange.

3.2.1.2 DEVELOPABLE LAND AND DEVELOPMENT TRENDS

Based on the Association of Bay Area Government's (ABAG) *Projections 2005*, Sonoma County is expected to gain over 40,000 households between 2000 and 2030. The City of Petaluma is projected to have the second highest growth rate in Sonoma County, adding 4,898 households during this period. The City of Cotati is expected to add approximately 888 households between 2000 and 2030. The City of Rohnert Park is projected to add approximately 2,567 households over the same period.



S C T A

Highway 101 HOV Lane Widening Project:
Old Redwood Highway, Petaluma to
Rohnert Park Expressway, Rohnert Park

EXISTING LAND USE
Figure 3.2-1

The *City of Petaluma General Plan: 1987-2005*, adopted in March 1987, projected 16,831 dwelling units in 1990. Nearly 80 percent of the dwellings were single-family units (including mobile homes), with approximately 20 percent in multi-family developments. Buildout, according to the *General Plan*, of commercial and office, industrial, and public space sites (schools, parks and agricultural land) within the City of Petaluma would result in approximately 600,000 square meters (m^2) [6.5 million square feet (ft^2)] of commercial and office uses, 2.2 million m^2 (23.7 million ft^2) of industrial uses and 1.9 million m^2 (20.6 million ft^2) of public uses.

The *City of Cotati General Plan* projects approximately 800 new housing units within the city limits, for a total residential capacity of about 3,200 housing units in 2010. Approximately 55 percent of new housing units would be in multi-family developments with the remaining 45 percent being in single-family or mobile home developments. The *General Plan* also shows that buildout of commercial, residential, industrial, public facilities, and rural and vacant lands within the city limits would result in approximately 497,606 m^2 (11 million ft^2) of commercial uses, 1.6 million m^2 (17.7 million ft^2) of residential uses, 313,918 m^2 (3.4 million ft^2) of industrial uses, 250,907 m^2 (2.7 million ft^2) of public facilities use and 1.7 million m^2 (18 million ft^2) of rural and vacant lands.

The *City of Rohnert Park General Plan* projects a total residential development capacity of approximately 19,990 housing units at buildout. The *General Plan* indicates that buildout of commercial, office, industrial and park/open space sites within the City of Rohnert Park would result in approximately 404,690 m^2 (4.4 million ft^2) of commercial uses, 708,200 m^2 (7.6 million ft^2) of industrial uses, 121,400 m^2 (1.3 million ft^2) of office uses and 768,900 m^2 (8.3 million ft^2) of park/open space uses.

3.2.1.3 MAJOR APPROVED AND ACTIVE PROJECTS

Major approved and active projects in the cities of Petaluma, Cotati and Rohnert Park are listed in Table 3.2-1 and shown in Figure 3.2-2. Approximately 35 projects, including residential, commercial, office, and industrial are under construction, approved or pending approval. The majority of these projects are located in the City of Cotati, east of Highway 101 and west of Old Redwood Highway.

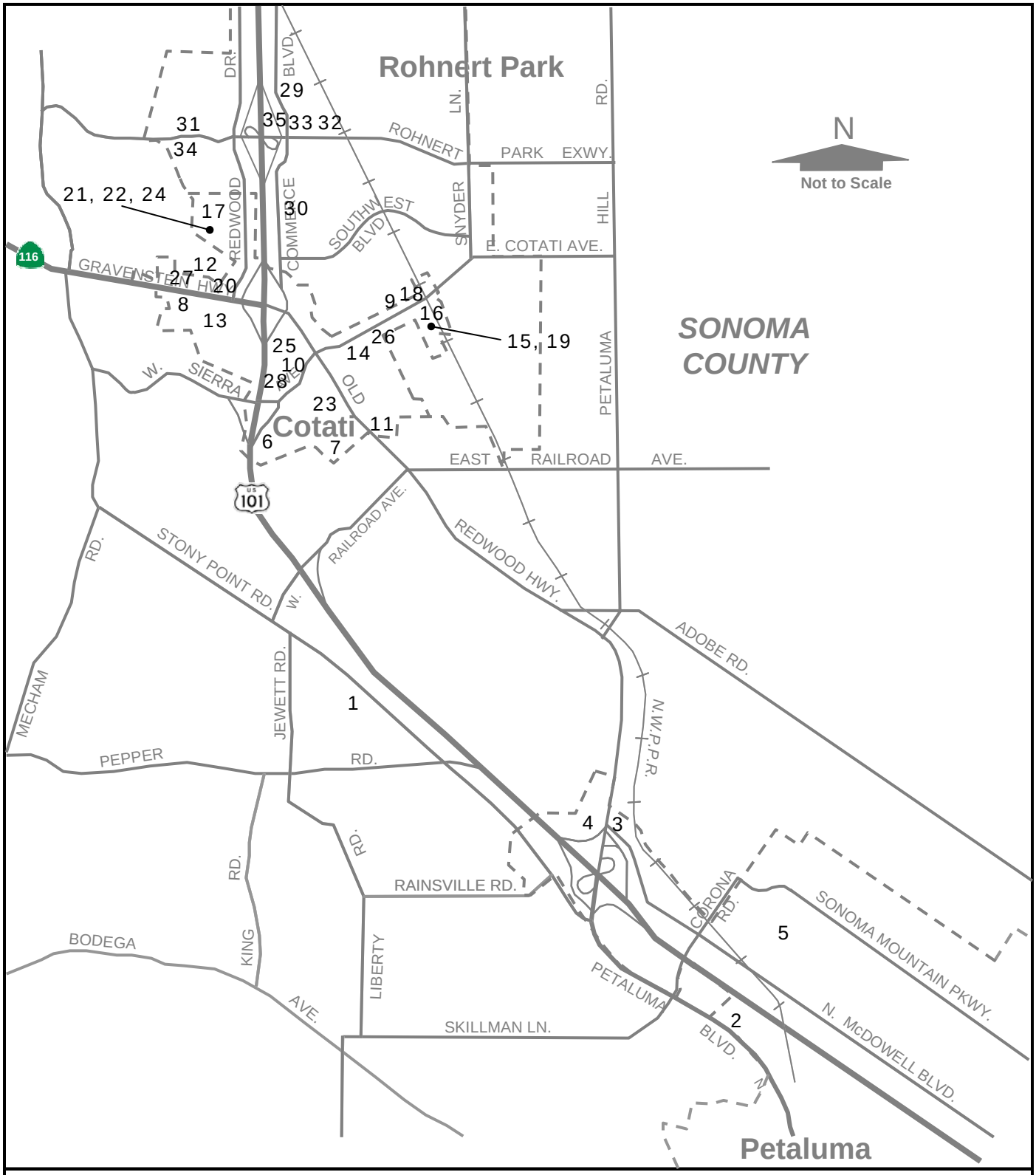
Table 3.2-1: Major Approved and Active Projects in the Study Area

No.	Project Name	Address	Approved hectares/acres	Approved Use	Project Status
Sonoma County (January 2005)					
1	Stony Point Road Stage 5A	Stony Point Road between Rainsville Road and Pepper Road	N/A	Transportation	Nearing Completion (1/05)
City of Petaluma (December 2004)					
2	Petaluma Village Marketplace	2200 Petaluma Boulevard North	2.27 / 5.60	Commercial	Planning Commission Review
3	The Redwood Technology Center	Old Redwood Highway and North McDowell Boulevard	5.83 / 14.40	Office	City Council Certified EIR & Approved General Plan Amendment
4	101 Casino	5151 Montero Way	0.13 / 0.33	Commercial	Application Submitted 10/26/04
5	Traditions/Turnbridge	Maria Drive and Sonoma Mountain Parkway	2.72 / 6.72	Residential	Under Construction
City of Cotati (December 2004)					
6	Twin Creeks Subdivision	8691 Water Road (Cervantes Court)	1.99 / 4.92	Residential	Under Construction
7	Cypress Meadows Subdivision	8780 Cypress Avenue	1.91 / 4.71	Residential	Three Permits Issued, Two Permits in Plan Check
8	Durenberger Subdivision	8028 Gravenstein Highway	3.84 / 9.50	Residential/ Commercial	Tentative Map Approval Extension
9	Willowglen	789 East Cotati Avenue	0.40 / 1.00	Residential	Under Construction
10	Heritage Gardens	251 & 203 East Cotati Avenue	1.66 / 4.10	Residential	Seven Building Permits Issued
11	Ristad Subdivision	193 Eucalyptus Avenue	0.37 / 0.92	Residential	Tentative Map Approved (10/03)
12	Cotati Cottages	7510 Alder Avenue	1.29 / 3.20	Residential	Project Nearing Completion
13	Gilman Subdivision	850 West Cotati Avenue	N/A	Residential	Final Design Review Approved (12/04)
14	Rancho Cotate Shopping Center	500 East Cotati Avenue	0.11 / 0.33	Commercial	Under Construction
15	Park Village Subdivision	Santero Way (west side)	0.51 / 1.27	Residential	Project Nearing Completion
16	Cotati Courtyard Subdivision	910 East Cotati Avenue	0.48 / 1.18	Residential	Final Design Review Pending
17	Long / Moore	526 Portal Street	0.06 / 0.16	Industrial/ Office	Permits Pending
18	Miller / Leys	East Cotati Avenue and Ryan Lane	0.24 / 0.30	Residential	Final Design Review Approval (11/04)
19	Village Park Subdivision, Phase 1B	Santero Way (east side)	0.51 / 1.27	Residential	Permits Pending
20	The Marketplace at Cotati Commons	Gravenstein Highway at Redwood Drive	9.31 / 23.00	Commercial	Under Construction
21	Blom / Matulich for Norcal Geophysical	321 Blodgett Street	0.07 / 0.18	Industrial/ Office	Permits Issued
22	P & L Specialties	373 Blodgett Street	0.21 / 0.52	Industrial	In Plan Check
23	Lasker Knolls	65 Lasker Lane	0.73 / 1.81	Residential	In Planning
24	Kandy Industrial Building	369 Blodgett Street	0.42 / 1.03	Industrial	Grading Permit Pending
25	Cotati Meadows	343 East School Street	N/A	Residential	In Planning

Table 3.2-1: Major Approved and Active Projects in the Study Area

No.	Project Name	Address	Approved hectares/acres	Approved Use	Project Status
26	Santero Court Partners	690 East Cotati Avenue	1.57 / 3.88	Residential	Final Design Review Pending
27	The Village at Cotati Commons	Gravenstein Highway at Alder Avenue	N/A	Residential/ Office	In Planning
28	Habitat for Humanity	20 Woodland Hills Drive	0.30 / 0.75	Residential	In Planning
City of Rohnert Park (October 2004)					
29	Creekwood Apartments/ Self Storage	Commerce Boulevard at Professional Center Drive	N/A	Commercial/ Residential	Self-Storage – Under Construction; Apartments –Permits Not Yet Applied
30	Marchisiello Office-to-Apartment Conversion	6920 Commerce Boulevard	N/A	Residential	Under Construction
31	Redwood Creek Apartments	Rohnert Park Expressway at Labath Avenue	N/A	Residential	Under Construction
32	The Arbors Mixed-Use Project	City Hall Drive	N/A	Residential/ Commercial	Approved – No Building Permits Applied For
33	City Center Townhomes	State Farm Drive at Padre Parkway	N/A	Residential	Some Site-Work Begun
34	Expressway Marketplace Pad Building	565 Rohnert Park Expressway	0.04 / 0.11	Commercial	Project Approved – No Permits Applied For
35	Radius Development Group Project	Commerce Boulevard and Rohnert Park Expressway	0.24 / 0.60	Commercial	Buildings Currently in Plan Check

Sources: Sonoma County Public Works Department, January 2005
City of Petaluma Community Development Department, December 2004
City of Cotati Planning and Building Department, December 2004
City of Rohnert Park Planning Department, October 2004



Legend:

City Boundary **Railroad** 5 **Projects Listed in Table 3.2-1**

SCTA **Highway 101 HOV Lane Widening Project: Old Redwood Highway, Petaluma to Rohnert Park Expressway, Rohnert Park**

MAJOR APPROVED AND ACTIVE DEVELOPMENTS IN THE PROJECT AREA

Figure 3.2-2

3.2.1.4 ENVIRONMENTAL CONSEQUENCES

Under the Build Alternative, land use changes would be associated with the acquisition of property for modifications to existing transportation facilities and construction of new facilities. There are two options under consideration for interchange improvements at the Highway 101/SR 116 Interchange, both of which require the same land use changes. The proposed project would convert approximately 1.49 ha (3.67 ac) of land to transportation use. Land use changes anticipated as a result of the Build Alternative (Options A and B) is provided in Table 3.2-2 below.

Within Sonoma County, land use changes would convert 0.0007 percent of the County's agricultural land to transportation use. Land use changes in the City of Petaluma would convert 0.1 percent of the city's total commercial land to transportation use. In the City of Cotati, the proposed project would convert 0.4 percent of the total governmental land (vacant), 0.3 percent of the total commercial land, and 0.2 percent of the total residential land to transportation use.

Table 3.2-2: Estimated Land Use Changes Anticipated as a Result of the Build Alternative (Options A and B)

Land Use Converted	Total Area Converted	
	hectares (ha)	acres (ac)
Agriculture to Transportation	0.44	1.08
Vacant or Other to Transportation	0.07	0.17
Commercial to Transportation	0.61	1.51
Residential to Transportation	0.37	0.91
Total	1.49	3.67

Source: Parsons 2005

3.2.1.5 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

Compensation would be provided for land use impacts as a result of residential and nonresidential relocations as described in Section 3.4.3, Relocations. Project effects on agricultural land and proposed mitigation measures are described in Section 3.3, Farmlands/Agricultural Lands.

3.2.2 Consistency with Regional and Local Plans

Planning goals and policies for the study area are guided by the *Sonoma County General Plan 1989, the Sonoma County Comprehensive Transportation Plan for 2004*, the *City of Petaluma General Plan*, the *City of Cotati General Plan* and the *City of Rohnert Park General Plan*.

3.2.2.1 AFFECTED ENVIRONMENT

Sonoma County General Plan (1989). Primary goals of the Land Use Element of the *Sonoma County General Plan (1989)* are to coordinate land use with growth projections, the phasing of rural and urban growth with availability of adequate services, open space separation between

cities/communities, opportunities for diverse rural and urban residential environments, the protection of agricultural lands and the preservation of scenic features and biotic resource areas. The *Sonoma County General Plan (2020)*, currently in process, will also contain the policies identified above.

Sonoma County Comprehensive Transportation Plan for 2004. The primary goal of the *Sonoma County Comprehensive Transportation Plan for 2004* is to provide a well-integrated circulation system that supports "smart" growth principles and a city-centered growth philosophy, through a collaborative effort of all the cities and the County. Primary objectives to obtain this goal include:

- Focus commute and through traffic onto Highway 101 and designate major arterial routes to serve primarily as connectors between urban areas, and
- Provide east/west connectivity within each community, including interchange improvements and to improve access to Highway 101.

City of Petaluma General Plan: 1987-2005. Land use objectives in the *City of Petaluma General Plan: 1987-2005* are to promote architectural and socioeconomic diversity within residential areas and to establish a realistic ratio between east side and west side growth. Policies set forth by the *General Plan* to obtain these objectives include:

- The City's growth management system shall be updated and revised from time-to-time;
- The City would not guarantee that any individual project will be able to achieve the maximum densities shown on the Land Use Map;
- Those parcels that are undevelopable shall continue to be identified and so designated on the City's plans;
- Minimizing the impacts of future airport development on nearby residential areas;
- Improving traffic flow; and
- Long-range planning for needed roads and infrastructure.

The following transportation policies in the *City of Petaluma General Plan* are relevant to the proposed project:

- Monitoring regional developments and their effect on Highway 101 and on Petaluma; and
- Maintaining an active role in the Highway 101 Corridor planning program with the purpose of assuring that the improvements eventually provided will enhance intra-city movement in Petaluma.

City of Cotati General Plan. The overall land use goal, as put forth by the *City of Cotati General Plan*, adopted in June 1998, is to establish an efficient and environmentally sensitive land use pattern that provides adequate space to meet housing and economic needs while maintaining Cotati's small town image. Objectives for meeting this goal include:

- Requiring all infrastructure improvements to occur concurrently with development;
- Not allowing new growth to exceed the City's ability to provide necessary public service;

- Developing a system of transportation facilities and services that provides safe and efficient access to all parts of the city;
- Providing convenient and safe movement within the city by establishing a traffic-way system in which the function and design of each street is consistent with the character and use of adjacent land;
- Identifying the areas where future development should occur; and
- Providing a network of open space or neighborhoods, to preserve the small town identity, visual amenities, and insure public safety.

The following transportation-related policy in the city of Cotati General Plan is relevant to the proposed project.

- Highest priority shall be given for improvements at the Highway 101/SR 116 Interchange to help reduce traffic congestion.

City of Rohnert Park General Plan. As stated in the *City of Rohnert Park General Plan*, July 2000, the overall land use goals for the City of Rohnert Park include;

- Increased connectivity between and within neighborhoods;
- Developing a comprehensive transportation demand management program that preserves Rohnert Park's quality of life, while maintaining a positive business environment;
- Reducing peak-hour traffic congestion and associated impacts, including air pollution, energy consumption, and noise;
- Providing for concentrations of activity and mixed-use and pedestrian-oriented development;
- Maintaining mobility and reduce traffic in congested locations;
- Improving connections between different parts of the city;
- Maintaining land use patterns that maximize residents' accessibility to parks, open space, and neighborhood shopping centers, and;
- Maintaining efficient land use patterns and ensuring that infill development maintains the scale and character of established neighborhoods.

Three transportation policies as set forth by the *City of Rohnert Park General Plan* are pertinent to the proposed project, as follows:

- Encouraging Caltrans, MTC, and SCTA to plan, fund, and implement HOV lanes along Highway 101 between Santa Rosa Avenue and SR 116;
- Working with Caltrans to coordinate widening projects, interchange improvements, and other improvements along Highway 101; and
- Encouraging Caltrans, in cooperation with the City of Cotati, to relocate the northbound on-ramp at the Highway 101/SR 116 Interchange.

3.2.2.2 ENVIRONMENTAL CONSEQUENCES

The proposed project would be consistent with local planning goals and policies and local jurisdictions' stated objectives for adding HOV lanes and making interchange improvements along the Highway 101 corridor. The No-Build Alternative would not support achievement of these goals.

3.2.3 Growth Inducement

3.2.3.1 AFFECTED ENVIRONMENT

The California Environmental Quality Act (CEQA) specifically requires that analysis and discussion of the growth inducing impacts of the project be included as part of an Environmental Impact Report. The growth inducement assessment examines the relationship of the project to economic and population growth and the construction of additional housing in the project area. It focuses on the potential for a project to facilitate or accelerate growth beyond planned developments, or induce growth to shift from elsewhere in the region. In the present analysis, the project's influence on area growth due to travel time savings is considered within the context of other relevant factors such as relative cost and availability of housing, availability of amenities, local and regional growth policies, and development constraints. The information presented in this section is taken from the technical report, *Growth Inducement Study for Highway 101 HOV Lane Widening and Improvements Project: Old Redwood Highway, Petaluma to Rohnert Park Expressway, Rohnert Park* (Parsons 2005).

Santa Rosa is the main regional employment center in Sonoma County. While there are many more jobs in Marin County, San Francisco, and rest of the Bay Area, these employment locations are far enough away from Sonoma County residential areas that Santa Rosa dominates the county's employment market. According to 2000 Census Journey to Work Tables, 82 percent of Sonoma residents work within the county. Only about eight percent of the work force commutes to Marin County and about four percent commutes to San Francisco. Thus, the majority of Sonoma County commute trips are within the county. Commuter traffic contributes to vehicle volumes exceeding capacity, resulting in severe congestion and increased travel times along Highway 101 through the project area, mostly during peak hours. The heavy traffic and delays on Highway 101 also lead to traffic spill-over onto local streets, which affects the quality of life in communities along the highway. These traffic issues would tend to constrain development and growth, particularly for the more remote areas in the northern portion of the county.

Because the Highway 101 HOV Lane Widening Project would improve traffic conditions and travel times through the project area and vicinity, it would potentially remove this constraint on future growth. The growth inducement analysis evaluated whether the proposed project, individually or when combined with the other HOV lane widening projects in the Highway 101 corridor (see Section 1.3.3, Related Projects), would support or lead to unplanned growth. The growth inducing effect of the project on development in sample residential growth areas throughout the Highway 101 corridor was estimated by quantifying project-induced reductions in travel time (enhanced accessibility) to Bay Area employment from the sample residential growth areas. The enhanced accessibility was then evaluated in context of other factors influencing growth pressures in the sample

areas, such as local and regional growth policies, growth constraints, the relative costs and availability of housing, and amenities available in the selected residential areas.

3.2.3.2 ENVIRONMENTAL CONSEQUENCES

Eight residential locations as shown in Figure 3.2-3 were selected for testing the growth inducement effects of the project. These residential locations included the communities of Healdsburg, Windsor, Santa Rosa, Sebastopol, Rohnert Park, Cotati, Penngrove and Petaluma. All of the Highway 101 corridor communities included in the growth inducement study are planning for growth, with increases from 16 percent to 43 percent (ABAG Projections 2003) in population projected by 2030; see Section 3.2.1.2, Developable Land and Development Trends.

Travel time savings that would be obtained with the Build Alternative, from Rohnert Park Expressway to Petaluma Boulevard South, are described in Section 3.1.2.4, 2030 Peak Hour Traffic Conditions under the Build Alternative, 'Travel Time'. Travel time savings would vary from five minutes to ten minutes, depending on direction and peak period. The travel time savings for trips between the eight residential zones and ten employment zones would vary from less than one minute to about eight minutes, depending on particular trip ends. Travel time savings for commuters from the selected residential areas to/from jobs in Sonoma County would vary from less than one minute to five minutes, while travel time savings to/from jobs in the rest of the Bay Area would vary from one minute to eight minutes.

The amount of travel time savings for trips within the county, from one to five minutes, although real and important, would reduce door-to-door work trip times by an average of only four percent. Also, providing HOV lanes would not solve all of Highway 101's congestion problems. Even with the proposed project, some highway congestion would remain and would gradually build over time (see Section 3.1, Traffic and Transportation). Hence, while the proposed project would be very essential to support the planned growth in the area, it would not even fully accommodate planned growth, let alone induce unplanned growth.

The results of the growth inducement analysis of the changes in accessibility to jobs showed a very slight increase in growth pressure (less than half a percent change in the growth indices) due to the travel time savings in Santa Rosa, Sebastopol, Rohnert Park and Cotati. However, an increase of less than half a percent in these residential areas is negligibly small.

Other factors in addition to traffic conditions also influence the climate for growth. All four communities mentioned above plan to control the location and amount of growth in their community. For example, the City of Rohnert Park plans to adopt a growth management plan that includes components such as an average approximately one percent annual population growth rate. The City of Santa Rosa has set urban growth boundaries to prevent urban sprawl. These types of actions would ensure that the proposed project would not stimulate unplanned growth.

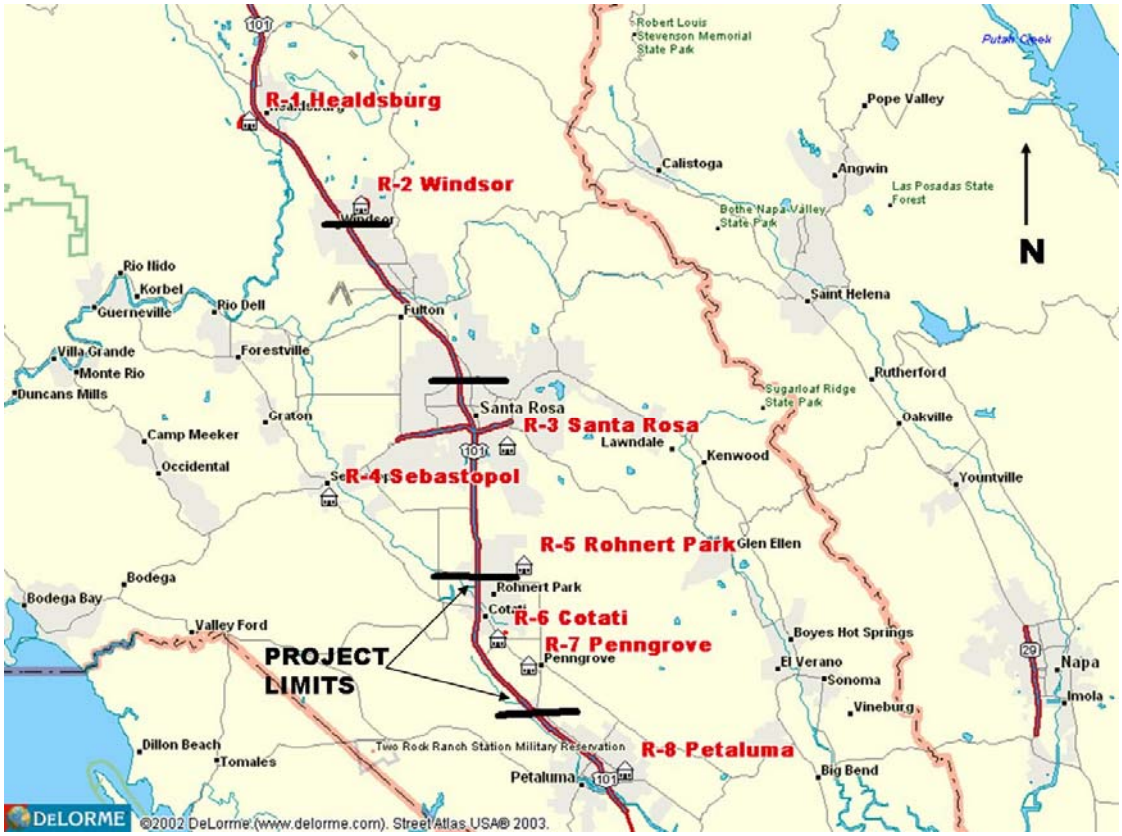


Figure 3.2-3: Residential Areas Studied for Growth Inducement Effects of the Project

Other primary factors that affect population growth pressures in outlying residential communities, in addition to commute time and growth plans of the residential areas, include the cost and availability of housing. Vacancy rate is defined as the percentage of total unoccupied housing units, which are either for sale or for rent. It provides a quantifiable measurement of housing demand. An overall vacancy rate of four to five percent indicates a healthy balance of supply and demand in the housing market. (See Section 3.4.3.2, Affected Environmental (Housing/Businesses) for more information on vacancy rates.) The housing vacancy rate for the four areas that could be affected by the proposed project varies between 0.7 and 1.2 percent, which indicates that the demand for housing in these residential areas is much higher than the available housing supply. High demand and low supply implies high housing costs, which are typical of Bay Area communities. Low housing vacancy rates and high housing costs tend to act as growth deterrents that would outweigh minor travel time savings.

In summary, growth management policies, as well as moderately high housing prices and low vacancy rates in those areas where commuters would realize the greatest potential travel time savings, when compared to other study areas and the rest of Sonoma County, would tend to discourage accelerated residential growth, even with the improved travel times. The growth inducement study concluded that the Highway 101 HOV Lane Widening Project would support planned growth, but not induce unplanned growth in the area.

3.3 Farmlands/Agricultural Lands

3.3.1 Regulatory Setting

3.3.1.1 FARMLAND PROTECTION POLICY ACT

The Farmland Protection Policy Act (7 Code of Federal Regulations (CFR) Ch. VI Part 658) requires federal agencies to take into account the adverse effects of their projects on farmlands, in part, by requiring an inventory, description, and classification of affected farmlands as well as early consultation with the Natural Resources Conservation Service (NRCS) and processing of Form NRCS – Conservation Planning Application (CPA)-106 (Farmland Conversion Impact Rating Form).

Farmland means prime or unique farmlands as defined in Section 1540(c)(1) of the Act or farmland that is determined by the appropriate state or unit of local government agency or agencies with concurrence of the U.S. Secretary of Agriculture to be farmland of statewide or local importance.

3.3.1.2 WILLIAMSON ACT

Known formally as the California Land Conservation Act of 1965, the Williamson Act (California Government Code Section 51291) was designed as an incentive to retain prime agricultural land and open space in agricultural use, thereby slowing its conversion to urban and suburban development. The program entails a 10-year contract between the city and an owner of land whereby land kept in agricultural use is taxed on the basis of its agricultural use rather than its market value. Notification provisions of the Act require an agency to notify the Director of the California Department of Conservation of the possible acquisition of Williamson Act contracted land for a public improvement. The local governing body responsible for the administration of the agricultural preserve must also be notified.

3.3.1.3 SONOMA COUNTY GENERAL PLAN

The main agricultural goal for Sonoma County is to promote a healthy and competitive agricultural industry whose products are recognized as being produced in Sonoma County. Agricultural lands are predominantly in the unincorporated areas of the county. Within the project area, agricultural resources are primarily located from just north of Petaluma to south of Cotati.

3.3.1.4 CITY OF PETALUMA GENERAL PLAN

The *City of Petaluma General Plan's* agricultural goal is to preserve and protect agricultural use on lands surrounding the City of Petaluma. Almost all the remaining agricultural land in the City of Petaluma is located in the northwest region of the city and adjacent to Sonoma County farmlands.

3.3.1.5 CITY OF COTATI GENERAL PLAN

Agricultural goals and policies as stated in the *City of Cotati General Plan* aim to preserve agricultural use on lands designated as rural by the City of Cotati land use map. The agricultural lands in the City of Cotati are located mostly in the western and southern sections of the city.

3.3.1.6 CITY OF ROHNERT PARK GENERAL PLAN

The *City of Rohnert Park General Plan's* primary agricultural goal is to minimize conflicts between the agricultural areas in unincorporated Sonoma County and urban uses in the City of Rohnert Park. Agricultural lands are located to the east and north of the City of Rohnert Park.

3.3.2 Affected Environment

Existing land uses along the Highway 101 corridor are predominately rural, as described in Section 3.2, Land Use Characteristics. Agricultural resources in the project area are located along both sides of Highway 101 between just north of Petaluma and south of Cotati.

3.3.3 Environmental Consequences

No-Build Alternative. Under the No-Build Alternative, no right-of-way would be acquired for transportation facilities within the study area; therefore, no farmland would be affected.

Build Alternative. The Build Alternative would require approximately 0.44 hectares (ha) (1.08 acres [ac]) of farmland for the HOV widening. Affected farmland would account for approximately 0.0007 percent of the total farmland in the county. The locations, Williamson Act status, and size of the affected parcels are summarized in Table 3.3-1.

Table 3.3-1: Farmland Impacts with the Build Alternative

APN#	Location (kilopost)	Williamson Act Contract	Farmland Impact (Hectares/Acres)
113-150-014	±17.71(PM 10.99)	No	0.36 ha / 0.89 ac
113-150-012	±17.71(PM 10.99)	Yes	0.08 ha / 0.19 ac
TOTAL			0.44 ha / 1.08 ac

Source: Parsons 2004, Sonoma County Assessor's Office.

In compliance with the Farmland Protection Policy Act, Parts I and III of Form NRCS-CPA-106 and maps for the proposed project were submitted to the NRCS for its determination of whether any part of the agricultural property that would be acquired for the project site is farmland subject to the Act. The NRCS review and completion on July 11, 2005 of Parts II, IV, and V of the form, indicates that the proposed project would acquire approximately 0.44 ha (1.08 ac) of statewide and local important farmland. This represents approximately 0.0007 percent of the total farmland subject to the Act in Sonoma County.

The total assessment criteria score for the farmland sites is 107. Based on federal regulation 7 CFR 658.4, sites receiving a total score of less than 160 points shall be given a minimal level of consideration for protection and no additional sites need be evaluated. Sites receiving a total score of 160 or greater, however, shall be given stronger consideration for protection including the evaluation of alternate sites, locations, and/or designs. The Farmland Conversion Impact Rating Form along with the Site Assessment Criteria and Point Rating are included in Appendix F.

The Sonoma County Tax Assessor's Office was contacted in June 2004 to report that the proposed project would acquire a portion of one parcel of land currently under a Williamson Act contract. The total proposed acquisition of Williamson Act contracted land is approximately 0.08 ha (0.19 ac). The Williamson Act generally requires that a project proponent demonstrate that there is no other land on which it is reasonably feasible to locate a public improvement before converting land under Williamson Act contract. Because the proposed project would provide HOV lanes in the median of existing Highway 101, the use of alternative lands to avoid conversion of Williamson Act lands is not reasonably feasible. Construction of a three-meter-tall (9.8 ft), 50-meter-long (164 ft) retaining wall would avoid taking the Williamson Act land, but given the take is so small, this approach was also not reasonable.

In accordance with Government Code Section 51291(b), the Director of the California Department of Conservation and the Sonoma County Planning Department would be notified prior to acquisition of any farmland under a Williamson Act contract. All comments received (within 30 days thereafter) from the Department of Conservation and Sonoma county shall be considered.

3.3.4 Avoidance, Minimization and/or Mitigation Measures

Since adverse impacts to farmlands from the Build Alternative would be extremely minor, no mitigation is proposed.

3.4 Community Impacts

This section identifies and analyzes existing and projected study area social conditions in terms of population characteristics such as age distribution, income, race, ethnicity; household size and composition; employment and labor force; community/neighborhood characteristics including public services and facilities; and circulation and access for groups and populations.

3.4.1 Community Character

3.4.1.1 AFFECTED ENVIRONMENT (DEMOGRAPHIC/HOUSEHOLD/NEIGHBORHOOD CHARACTERISTICS)

Demographic characteristics of the affected environment are derived from 2000 U.S. Census Data and *ABAG Projections 2005: Forecasts for the San Francisco Bay Area to the Year 2030.* The study area is defined by census tract block groups adjacent to and within one-half mile of the proposed project alignment, as shown in Figure 3.4-1.

Ethnic Mix

An ethnic profile of the existing population is derived from U.S. Census Bureau 2000 data. The ethnic categories used are White, Black or African American, Hispanic, Asian, American Indian and Alaska Native, Native Hawaiian or Other Pacific Islander, Some Other Race and Two or More Races.

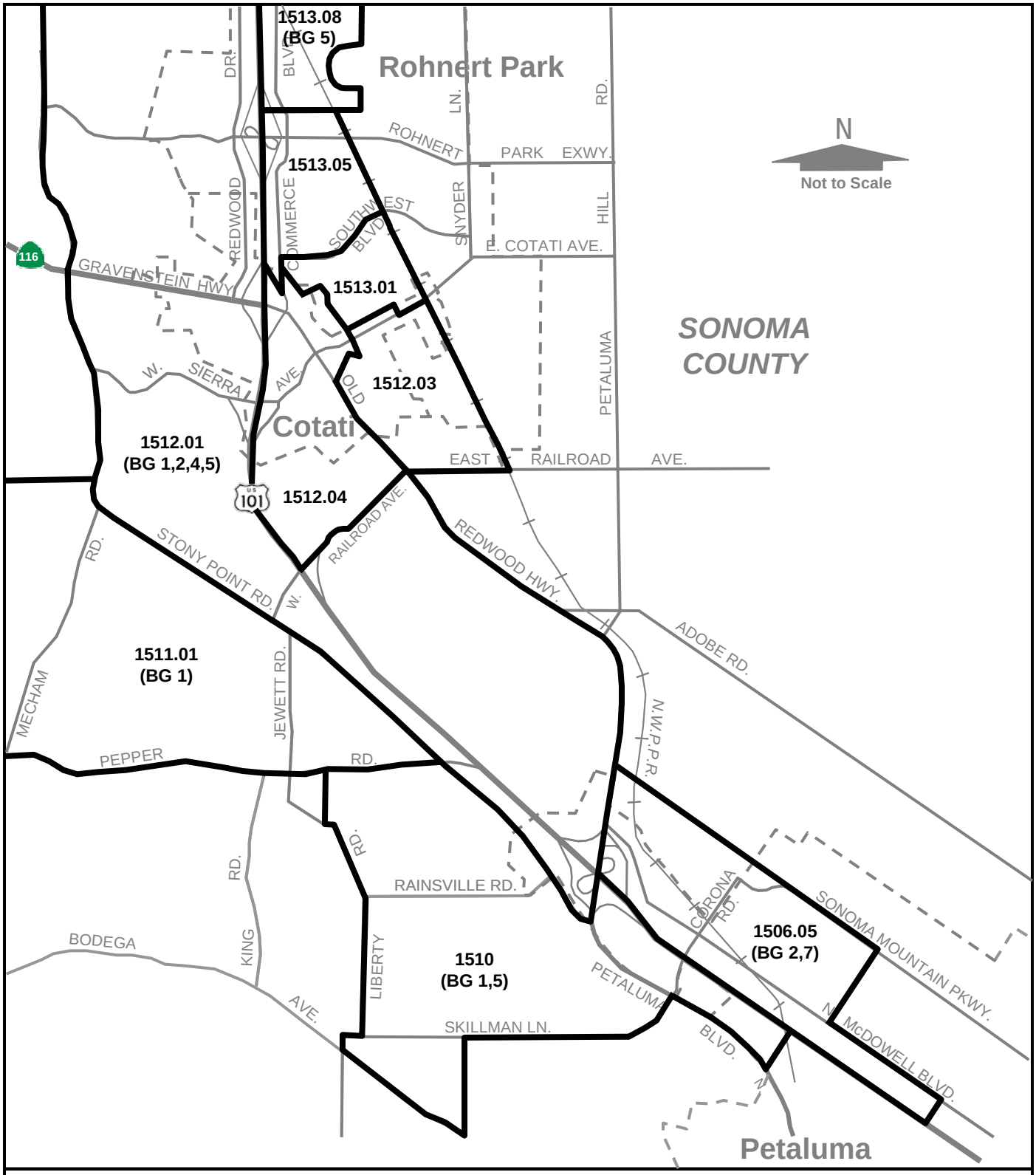
As shown in Table 3.4-1 below, 26 percent of the population in the study area is part of an ethnic minority group. Sonoma County and the City of Rohnert Park are comparable in their ethnic composition with 25 and 26 percent of residents, respectively, being part of an ethnic minority group. The ethnic composition in the cities of Petaluma and Cotati is slightly less diverse with an ethnic minority population of 23 percent. Persons of Hispanic origin represent the greatest percentage of ethnic minority populations in each area.

Table 3.4-1: Ethnic Composition

Geographic Area	Total Persons	White	%	Black or African American	%	Hispanic	%
Study Area	33,465	24,859	74	627	2	5,192	16
Sonoma County	458,614	341,686	75	6,116	1	79,511	17
City of Petaluma	54,548	41,996	77	581	1	7,985	15
City of Cotati	6,471	4,962	77	148	2	810	13
City of Rohnert Park	42,236	31,266	74	799	2	5,731	14

Geographic Area	Asian	%	American Indian/ Alaska Native	%	Native Hawaiian/ Other Pacific Islander	%	Some Other Race/Two or More	%
Study Area	1,246	4	203	0.6	80	0.2	1,258	4
Sonoma County	13,786	3	3,477	0.8	828	0.2	13,210	3
City of Petaluma	2,089	4	173	0.3	85	0.2	1,639	3
City of Cotati	231	4	42	0.6	13	0.2	265	4
City of Rohnert Park	2,320	5	202	0.5	168	0.4	1,750	4

Source: 2000 U.S. Census Data



Legend:

- **Census Tract Boundary**
- **City Boundary**
- **1511.01 Census Tract Number (BG 1) Block Group Number**
- **Railroad**

Source: 2000 U.S. Census Bureau

S C T A

**Highway 101 HOV Lane Widening Project:
Old Redwood Highway, Petaluma to
Rohnert Park Expressway, Rohnert Park**

SOCIOECONOMIC STUDY AREA CENSUS TRACTS
Figure 3.4-1

Income

Table 3.4-2 provides information on income and poverty status for the study area, Sonoma County and the cities of Petaluma, Cotati and Rohnert Park. The 2000 median household income in these jurisdictions was $53,076 (Sonoma County), $61,679 (Petaluma), $52,808 (Cotati), and $51,942 (Rohnert Park). The median household income for the study area census tracts was $49,997. Approximately nine percent of study area households were below poverty level, slightly higher than the poverty levels for Sonoma County and the cities of Petaluma, Cotati and Rohnert Park.

Table 3.4-2: Household Income

Geographic Area	Median Household Income	% Population Below Poverty Level
Study Area	$49,997	9%
Sonoma County	$53,076	8%
City of Petaluma	$61,679	6%
City of Cotati	$52,808	8%
City of Rohnert Park	$51,942	8%

Source: 2000 U.S. Census Data

Population, Housing and Employment Growth

Existing and projected population, housing and employment for Sonoma County and the cities of Petaluma, Cotati and Rohnert Park are shown in Table 3.4-3.

Table 3.4-3: 2000-2030 Population, Housing and Employment Growth

	Population			Households			Employment (Jobs)		
Area	2000	2030	% Change	2000	2030	% Change	2000	2030	% Change
Sonoma County	458,614	558,400	22%	172,403	213,840	24%	221,490	328,310	48%
City of Petaluma	55,743	67,700	21%	20,386	25,360	24%	32,480	45,230	39%
City of Cotati	7,279	9,600	32%	2,839	3,840	35%	3,180	6,480	104%
City of Rohnert Park	43,148	49,400	14%	15,697	18,410	17%	17,940	39,340	119%

Source: 2000 U.S. Census Data, *ABAG Projections 2005*

Population and Housing. According to ABAG projections, total population in Sonoma County is expected to grow from 458,614 to 558,400 persons, an increase of 22 percent, between 2000 and 2030. Population in the City of Petaluma is expected to increase similarly with a growth rate of 21 percent. A substantial growth rate of 32 percent is projected for the City of Cotati. The growth rate for the City of Rohnert Park is expected to increase by approximately 14 percent. Households are projected to increase commensurately, with a 24 percent increase in Sonoma County and the City of Petaluma, a 17 percent increase in the City of Rohnert Park, and a 35 percent increase in the City of Cotati between 2000 and 2030.

Employment. Employment in Sonoma County and the City of Petaluma is projected to increase much more rapidly than population, with a 48 and 39 percent increase in jobs anticipated between 2000 and 2030, respectively. Employment in the City of Rohnert Park is expected to more than double over the same period. The City of Cotati expects a 104 percent increase in jobs, which is nearly three times greater than the expected growth in population. These employment increases may indicate an improvement in the jobs/housing balance within Sonoma County as a whole, but projections emphasize continued demand for travel along Highway 101 with more people commuting to jobs in to Sonoma County. Highway 101 is expected to continue being the primary north-south route to local and regional employment and commercial opportunities.

Community/Neighborhood Characteristics

The proposed project would pass through portions of neighborhoods in the planning subareas of Sonoma County and the cities of Cotati and Rohnert Park. Planning areas and neighborhoods in the project vicinity are described below.

Sonoma County Planning Areas

Rohnert Park-Cotati Planning Area. The Rohnert Park-Cotati Planning Area is located along the Highway 101 corridor in central Sonoma County and includes the cities of Rohnert Park and Cotati and the unincorporated area of Penngrove. Of the nine planning areas in Sonoma County, this is the smallest in area, but the highest in population density. Many residents in the Rohnert Park-Cotati Planning Area commute to work in Santa Rosa, Petaluma and the Bay Area.

Petaluma Planning Area. The Petaluma Planning Area is in the southwest portion of Sonoma County, extending along the Highway 101 corridor from the unincorporated area of Penngrove to the Marin County line. Historically, the area has been the production center for poultry and dairy products. This planning area has a relatively large share of financial, communications, business services and personal services employment.

City of Cotati Planning Areas

Gravenstein Highway Corridor Master Plan Area. The Gravenstein Highway Corridor Master Plan Area is located south of Gravenstein Highway (SR 116) between Madrone Avenue in the west

and West Cotati Avenue in the east. The Master Plan provides for up to 49 new housing units and approximately 20 acres of commercial development.

La Plaza Specific Plan Area. Located in a 65-acre area surrounding La Plaza Park in downtown Cotati, the La Plaza Specific Plan Area was established to provide guidance on the revitalization of the downtown area as follows:

- Creating a long term vision for the 60 acres of public and private land within and adjacent to the Plaza;
- Establishing goals, objectives and policies that guide public and private development and conservation within the study area; and
- Identifying a range of implementation strategies and techniques to transform the vision of the La Plaza Park and downtown into reality.

City of Rohnert Park Planning Areas

Northwest Specific Plan Area. Located in the northwest boundaries of Rohnert Park, the Northwest Specific Plan Area is composed of an even mix of industrial, commercial, and high-density residential land uses.

Wilfred Dowdell Village Specific Plan Area. The Wilfred Dowdell Village Specific Plan Area is a 25-acre site located west of Highway 101 between Willis and Dowdell Avenues. The Specific Plan allows for the development of urban commercial uses.

3.4.1.2 ENVIRONMENTAL CONSEQUENCES

Community cohesion is defined as the degree to which residents have a sense of belonging to their neighborhood or experience attachment to community groups and institutions, as a result of continued association over time. The new transportation facilities would not constitute any new physical or psychological barriers that would divide, disrupt, or isolate neighborhoods, individuals, or community focal points in the corridor. Because the Highway 101 HOV lane would be widened within its median, the communities and neighborhoods adjacent to Highway 101 would not experience a disruption in cohesion.

As discussed in Section 3.4.3, Relocations, the proposed highway and interchange improvements would require both full and partial acquisition of residential, commercial, agricultural and existing transportation property along the Highway 101 corridor within the study area. In instances of partial property takes, access would be maintained to avoid long-term effects to residents and communities.

Right-of-way acquisition requirements for the Build Alternative would require the relocation of three residential properties on the northeast corner of the Highway 101/SR 116 Interchange in Cotati, and

one business on the northeast corner of the Highway 101/Petaluma Boulevard—Old Redwood Highway Interchange in Petaluma.

Additionally, the proposed project would acquire partial takes of other properties along the proposed alignment. These estimated acquisition requirements primarily would affect parking for some commercial businesses along the proposed right-of-way. An estimated 0.61 ha (1.51 ac) of commercial properties, 0.37 ha (0.91 ac) of residential property and 0.07 ha (0.17 ac) of vacant or other property would be acquired. As described in Section 3.1.2.6, Parking, the affected businesses would still have adequate parking as required by the standards of the City of Petaluma.

3.4.1.3 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

As there would be no substantially adverse impacts to neighborhoods or community cohesion, no mitigation is proposed. Relocation assistance is discussed in Section 3.4.3.1. Measures to mitigate impacts to neighborhoods and businesses as a result of noise and vibration and visual changes are described in their respective sections.

3.4.2 Community Facilities and Public Services

3.4.2.1 AFFECTED ENVIRONMENT

Public services and facilities located in the study area, including police, fire, medical, educational and cultural are described below.

Police and Fire Services. Police protection and traffic enforcement in the study area are provided by the Sonoma County Sheriff's Department, California Highway Patrol, and the police departments of the cities of Petaluma, Cotati and Rohnert Park. Precinct stations for the Cotati Police Department and the California Highway Patrol are located in the study area at 203 West Sierra Avenue in Cotati and 6100 Labath Avenue in Rohnert Park, respectively.

The Sonoma County Department of Emergency Services and the fire departments of the cities of Petaluma, Cotati and Rohnert Park provide fire protection services and emergency medical rescue services for the study area. Four fire stations are located in the study area.

Schools. Ten public and three private schools are located in the study area, including the University of Northern California. Public schools in the study area are within the jurisdiction of the Cotati-Rohnert Park Unified and Cinnabar School Districts.

Libraries. The Rohnert Park-Cotati Regional library is located in Rohnert Park within the study area.

Other Cultural Facilities. There are a number of cultural facilities within the study area, including the Rohnert Park Senior Center, Rohnert Park Boys and Girls Club, Northbay Veteran's Center, and the Rohnert Park and Cotati city halls.

Other public facilities in the study area include three post offices and two transportation facilities.

Houses of Worship and Cemeteries. There are 20 houses of worship of various denominations and two cemeteries located within the study area.

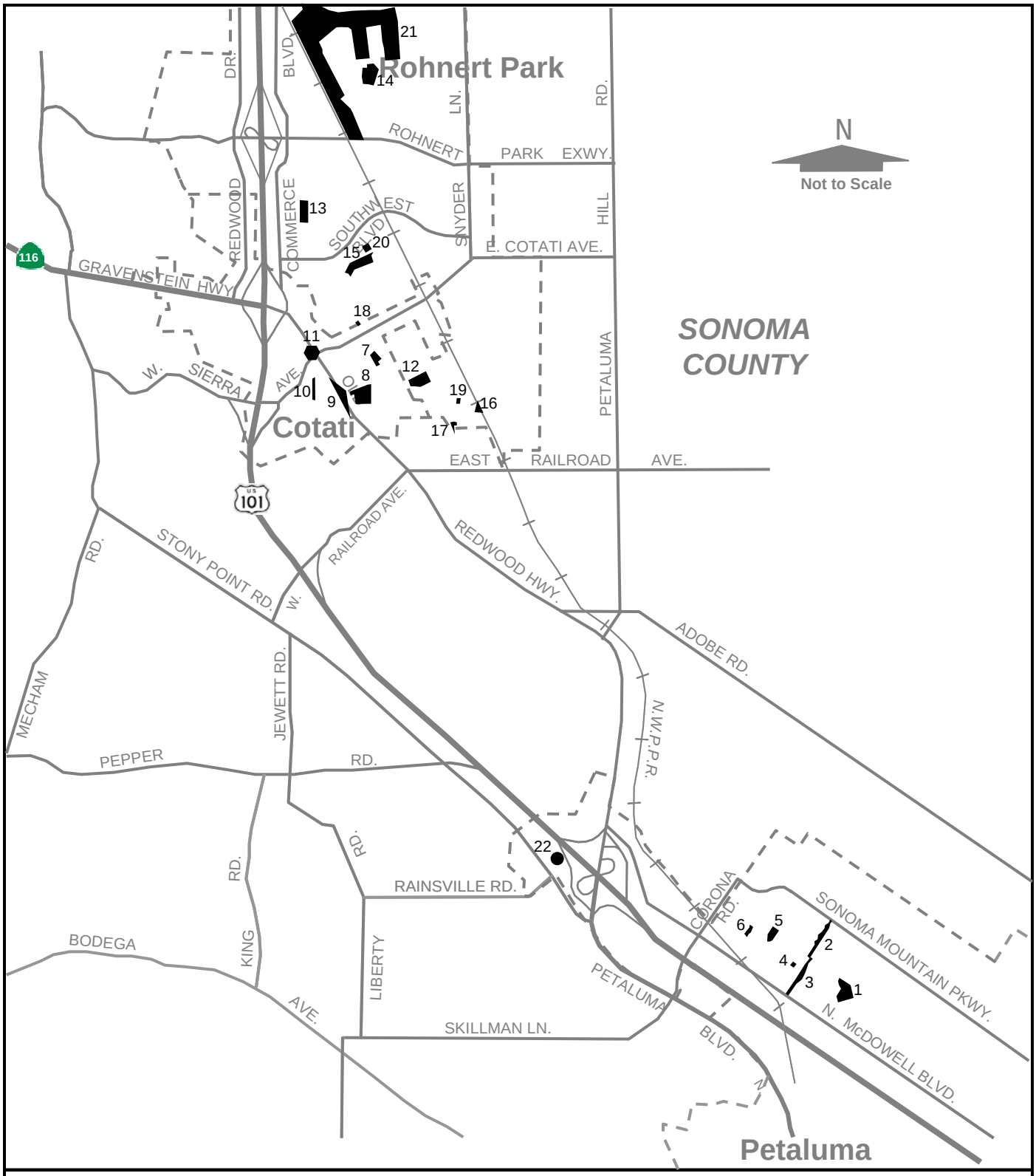
Recreational Facilities. As listed in Table 3.4-4 and shown in Figure 3.4-2, there are 22 park and recreational facilities within the study area. Numbers on the table are keyed to locations shown in the figure. With the exception of the Foxtail Willows Golf Course and the Petaluma Golf Center, all these facilities are operated by the cities of Petaluma's, Cotati's and Rohnert Park's respective park and recreation departments.

Public Utilities. Water service is provided by the Cities of Petaluma, Cotati, and Rohnert Park. The cities also provide wastewater collection and treatment within the study area. However, there are no wastewater facilities within the project limits.

Table 3.4-4: Existing Park and Recreational Facilities in the Study Area

No.	Name	Address/Location	No.	Name	Address/Location
Parks – City of Petaluma					
1	Bond Park	Banff Way at Maria Drive	4	Capri Park	Capri Avenue
2	Glenbrook Park	Lancaster Drive at Inverness Drive	5	Meadow View	Yarberry Drive at Dupree Way
3	Sunrise Park	Maria Drive at Sunrise Parkway	6	McDowell Meadows	Morning Glory Drive at Wood Sorrel Drive
Parks – City of Cotati					
7	Kotate Park	La Salle and Lincoln Avenue	10	Delano Park	Page Street and Delano Court
8	Helen Putnam Park	Myrtle Avenue	11	The Plaza	La Plaza
9	Veterans Park	Old Redwood Highway and Park Avenue			
Parks – City of Rohnert Park					
12	Ladybug Park	8517 Liman Way	16	La Crosse Mini Park	La Crosse Court
13	Alicia Park	300 Arlen Drive	17	Lydia Mini Park	Lydia Lane
14	Dorotea Park	895 Santa Dorotea Circle	18	Burton Avenue Tot Lot	Burton Avenue
15	Benicia Park	7450 Santa Barbara Drive	19	Lilac Tot Lot	Lilac Way
Recreation Centers – City of Rohnert Park					
20	Burton Avenue Recreation Center	7421 Burton Avenue			
Golf Courses / Driving Ranges – Private					
21	Foxtail Golf Club	100 Golf Course Drive			
22	Petaluma Golf Center	200 Stony Point Road			

Source: Parsons 2004.



S C T A

Highway 101 HOV Lane Widening Project: Old Redwood Highway, Petaluma to Rohnert Park Expressway, Rohnert Park

PARKS AND RECREATIONAL FACILITIES
Figure 3.4-2

3.4.2.2 ENVIRONMENTAL CONSEQUENCES

The long-term effect of the proposed project would be to reduce congestion and diversion of freeway traffic to local streets. Thereby, it would enhance accessibility to the greater Highway 101 project area, which would benefit the community facilities identified in Section 3.4.2.1. None of these facilities would be adversely affected or displaced by the proposed project. As shown in Figure 3.4-3, a small strip of land along the Petaluma Golf Center, a private recreational facility, would be acquired by the proposed project; however, this property acquisition is not anticipated to have an adverse effect on the business. The Build Alternative would not constitute a "use" of publicly owned land under Section 4(f) of the U.S. Department of Transportation Act of 1966. Impacts during the construction phase are described in Section 3.16.4, Community Impacts.

Domestic water services, wastewater facilities and solid waste disposal would not be affected by the proposed project, which would not induce unplanned growth or substantially increase stormwater run-off.

3.4.2.3 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

As there would be no adverse effects on community facilities, no mitigation measures are proposed. Avoidance and minimization measures to be implemented during the construction phase are described in Section 3.16.4, Community Impacts.

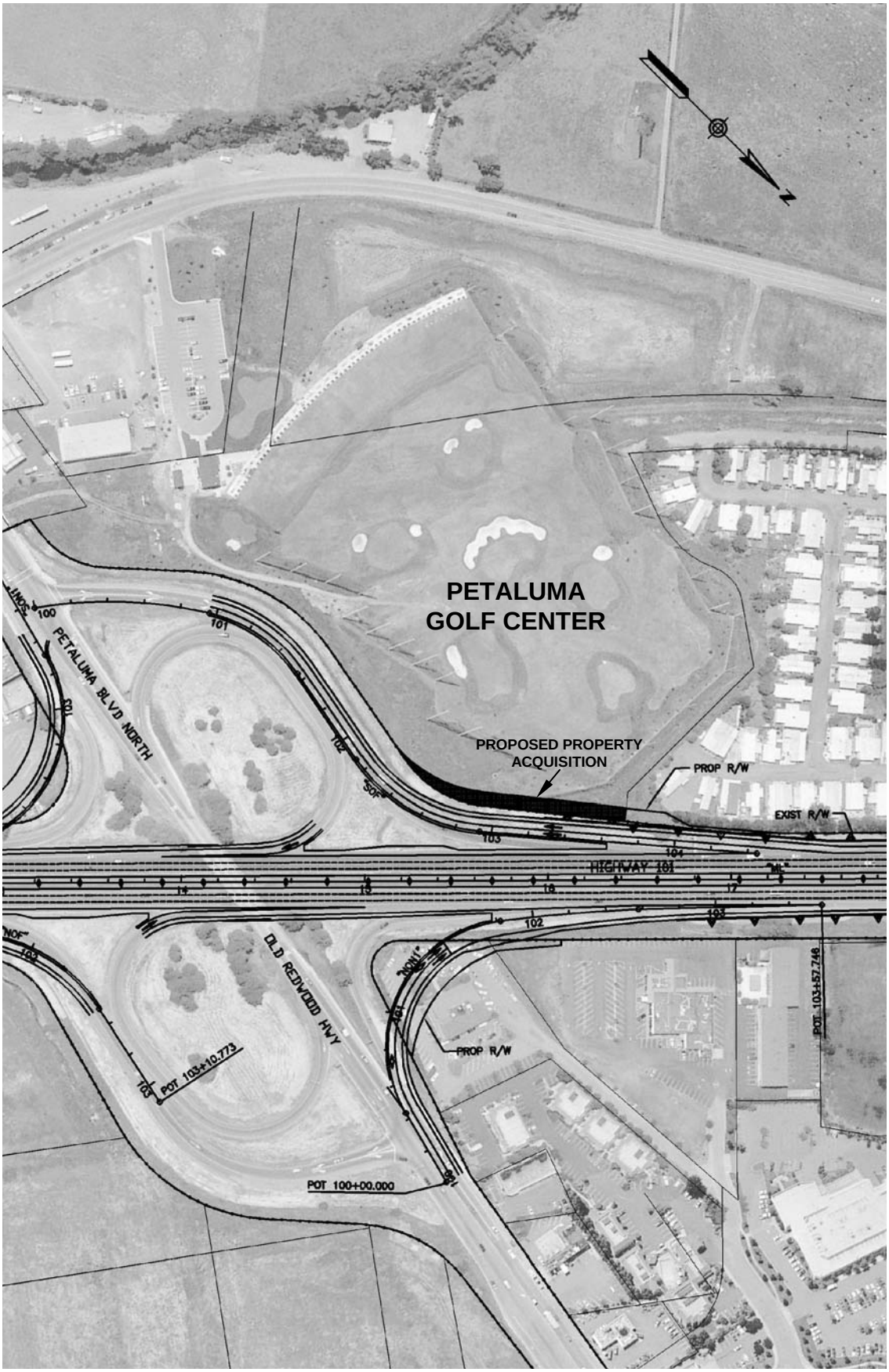
3.4.3 Relocations

3.4.3.1 REGULATORY SETTING

The Uniform Relocation Assistance and Real Property Acquisition Act of 1970, as amended, mandates that certain relocation services and payments be made available to eligible residents, businesses and non-profit organizations displaced by construction and operation of transit-related projects. The Act establishes uniform and equitable procedures for land acquisition, and provides for uniform and equitable treatment of persons displaced from their homes, businesses, or farms by federal and federally assisted programs.

Owners of private property have federal and state constitutional guarantees that their property will not be taken or damaged for public use unless they first receive just compensation. Just compensation is measured by the "fair market value" of the property to be taken. Where acquisition and relocation are proposed, Caltrans would follow provisions of the Uniform Act, as amended, and in conformance with all applicable regulations. All real property to be acquired would be appraised to determine its fair market value. An offer of just compensation, not less than the approved appraisal, would be made to each property owner.

Each homeowner, renter or business displaced as a result of the project would be given advance written notice and would be informed of eligibility requirements for relocation assistance and payments.



S C T A

Highway 101 HOV Lane Widening Project: Old Redwood Highway, Petaluma to Rohnert Park Expressway, Rohnert Park

PROPOSED PROPERTY ACQUISITION AT THE PETALUMA GOLF CENTER
Figure 3.4-3

3.4.3.2 AFFECTED ENVIRONMENT (HOUSING/BUSINESSES)

Residential Characteristics

Residential characteristics in the project area are shown in Table 3.4-5. Housing statistics for neighborhoods and census tracts in the project study area indicate that while vacancy rates, housing types and costs vary somewhat within the study area, they are generally consistent. The City of Rohnert Park most closely resembles the study area as a whole. The percentages of single-unit structures is higher in the cities of Petaluma and Cotati, and vacancy percentages are lower in the City of Cotati.

Vacancy Rates. Vacancy rate is defined as the percentage of total unoccupied housing units, which are either for sale or for rent. Vacancy rates provide a quantifiable measurement of housing demand. An overall vacancy rate of four to five percent indicates a healthy balance of supply and demand in the housing market. According to U.S. Census Data, 2,379 units were for sale or for rent in Sonoma County in 2000, representing 1.3 percent of the total housing stock. The vacancy rates for the study area, cities of Petaluma, Cotati and Rohnert Park were one percent or less, indicating that the demand for housing is high for the study area and Sonoma County as a whole.

Housing Costs. The median housing value in 2000 for Sonoma County and the cities of Petaluma, Cotati and Rohnert Park was $265,200, $282,800, $217,100 and $222,000, respectively. As indicated in Table 3.4-5, the median household value for the study area census tracts was $211,200.

Housing Stock Projections. *ABAG Projections 2005* forecast an additional 40,747 new housing units in Sonoma County over the 30-year period between 2000 and 2030. Approximately 4,254 new housing units are projected for the Petaluma area and 3,497 for Rohnert Park, a 21 and 23 percent increase, respectively. The Cotati area is forecast to acquire approximately 961 new housing units between 2000 and 2030, a 34 percent increase.

Table 3.4-5: Residential Characteristics

Geographic Area	Total Housing Units	Single-Family		Multi-Family		Other		Mobile Home	
Study Area	12,902	7,998	62%	3,329	26%	10	0.08%	1,565	12%
Sonoma County	183,153	139,420	76%	32,352	18%	596	0.33%	10,785	6%
City of Petaluma	20,304	16,415	81%	2,992	15%	0	0.00%	933	5%
City of Cotati	2,585	1,863	72%	563	22%	0	0.00%	119	5%
City of Rohnert Park	15,808	9,361	59%	5,045	32%	52	0.33%	1,362	9%

Geographic Area	Median Household Value (2000$)	Median Gross Rent	Owner Occupied		Renter Occupied		Total Vacant		Vacant/for Rent/ for Sale Only	
Study Area	$211,200	$828	7,312	57%	5,331	41%	259	2%	103	0.80%
Sonoma County	$265,200	$864	110,475	60%	61,928	34%	10,750	6%	2,379	1.30%
City of Petaluma	$282,800	$946	13,964	69%	5,968	29%	372	2%	194	0.96%
City of Cotati	$217,100	$885	1,637	63%	895	35%	53	2%	12	0.46%
City of Rohnert Park	$222,000	$903	9,054	57%	6,449	41%	305	2%	160	1.01%

Source: 2000 U.S. Census Data.

Business Characteristics

Tax Revenue. In the fiscal year 2002-2003, collected secured and unsecured property taxes for Sonoma County were approximately $114 million. The sales tax revenue for the cities of Petaluma, Cotati and Rohnert Park were $10,264,737, $1,132,005 and $6,089,367, respectively.

Employment. Total jobs by sector in Sonoma County and the cities of Petaluma, Cotati and Rohnert Park are shown in Table 3.4-6. Based on ABAG projections, the number of jobs in Sonoma County is anticipated to increase approximately 48 percent from 221,430 to 328,310, between 2000 and 2030. Sonoma County's economic base is primarily supported by jobs in the service industry. The service sector will experience a growth rate of 56 percent; manufacturing 44 percent; retail 43 percent; other jobs 52 percent; and agriculture will have a decrease of five percent. Table 3.4-7 shows the major employers of Sonoma County according to the California Employment Development Department.

The City of Petaluma is expecting a lower growth rate (39 percent) in the number of jobs than Sonoma County between 2000 and 2030. Agricultural jobs will grow by only a modest 11 percent over the same time period. City of Petaluma's highest growth will be in service industry jobs, which will grow by 43 percent.

Overall job growth in the City of Cotati is expected to nearly double between 2000 and 2030, with service and manufacturing industries jobs growing in a dramatic 110 and 95 percent, respectively. Agriculture will be the least affected industry in the City of Cotati with a growth rate of 67 percent between 2000 and 2030. In comparison, Cotati's expected growth in agriculture jobs will be only 67 percent.

Job growth in the City of Rohnert Park will be the highest in the study area with a 119 percent growth from 2000 to 2030. Rohnert Park the service and retail industries will experience the highest growth rates with 139 percent and 119 percent, respectively. Agricultural jobs in Rohnert Park are not expected to increase as a proportion of total jobs between 2000 and 2030.

Table 3.4-6: Jobs By Sector 2000 – 2030

	Total				Service			
Geographic Area	2000	2030	Absolute Change	% Change	2000	2030	Absolute Change	% Change
Sonoma County	221,430	328,310	106,880	48%	38,980	60,680	21,700	56%
City of Petaluma	32,480	45,230	12,750	39%	5,810	8,320	2,510	43%
City of Cotati	3,180	6,480	3,300	104%	390	820	430	110%
City of Rohnert Park	17,940	39,340	21,400	119%	3,990	9,530	5,540	139%
	Retail				**Manufacturing**			
Geographic Area	2000	2030	Absolute Change	% Change	2000	2030	Absolute Change	% Change
Sonoma County	26,890	38,380	11,490	43%	45,510	65,500	19,990	44%
City of Petaluma	4,380	5,720	1,340	31%	9,290	12,280	2,990	32%
City of Cotati	570	1,070	500	88%	780	1,520	740	95%
City of Rohnert Park	2,220	4,860	2,640	119%	4,240	9,350	5,110	121%
	Agricultural				**Other**			
Geographic Area	2000	2030	Absolute Change	% Change	2000	2030	Absolute Change	% Change
Sonoma County	6,510	6,200	-310	-5%	103,540	157,550	54,010	52%
City of Petaluma	440	490	50	11%	12,560	18,420	5,860	47%
City of Cotati	30	50	20	67%	1,410	3,020	1,610	114%
City of Rohnert Park	0	0	0	0%	7,490	15,600	8,110	108%

Source: *ABAG Projections 2005: Forecasts for the San Francisco Bay Area to the Year 2030*.

Table 3.4-7: Major Employers in Sonoma County

Employer Name	Location	Industrial
Advanced Fibre Communications	Petaluma	Communications Equipment
Agilent Technologies	Santa Rosa & Rohnert Park	Measuring & Controlling Devices
County of Sonoma	Santa Rosa	Public Administration (Government)
Kaiser Permanente Medical Group Inc.	Santa Rosa	Offices & Clinics of Medical Doctors
Safeway	Santa Rosa	Grocery Stores
Santa Rosa City Schools District	Santa Rosa	Elementary & Secondary Schools
Santa Rosa Jr. College District	Santa Rosa	Colleges & Universities
Santa Rosa Memorial Hospital	Santa Rosa	Hospitals
Sonoma State University	Santa Rosa	Colleges & Universities
St. Joseph Home Care Network	Petaluma	Hospitals
State Farm Insurance	Rohnert Park	Fire, Marine & Casualty Insurance
Sutter Medical Center of Santa Rosa	Santa Rosa	Hospitals

Source: 2002 America's Labor Market Information System (ALMIS) Employer Database

Labor Force Characteristics. An estimated 44,128 civilians, age sixteen and over, were in the labor force in the study area in 2000, according to U.S. Census Bureau information. Of this total, 42,181 were employed and 4.4 percent, or 1,947 persons were unemployed. Educational, health and social services represented over 15 percent of the labor force, followed by retail trade with 13 percent and manufacturing with nearly 12 percent. The unemployment rate for the study area was 4.4 percent, comparable to that of Sonoma County and the cities of Petaluma and Cotati. Employed persons by occupation are shown in Table 3.4-8.

Table 3.4-8: Labor Force By Occupation – 2000 (Civilians Age 16+)

	Study Area		Sonoma County		City of Petaluma		City of Cotati		City of Rohnert Park	
Agriculture, forestry, fishing and hunting, and mining:	616	1.4%	5,912	2.5%	273	0.9%	10	0.3%	70	0.3%
Construction	4,067	9.2%	19,400	8.1%	2,188	7.4%	355	9.7%	1,706	7.2%
Manufacturing	5,057	11.5%	29,019	12.1%	2,779	9.4%	434	11.9%	3,036	12.9%
Wholesale trade	1,309	3.0%	7,104	3.0%	936	3.2%	180	4.9%	615	2.6%
Retail trade	5,891	13.3%	27,321	11.4%	3,424	11.6%	454	12.5%	3,441	14.6%
Transportation and warehousing, and utilities:	1,838	4.2%	9,384	3.9%	1,319	4.5%	130	3.6%	1,044	4.4%
Information	1,494	3.4%	6,048	2.5%	988	3.4%	113	3.1%	756	3.2%
Finance, insurance, real estate and rental and leasing:	4,031	9.1%	17,948	7.5%	2,878	9.8%	294	8.1%	2,420	10.3%
Professional, scientific, management, administrative, and waste management:	4,333	9.8%	24,806	10.4%	3,468	11.8%	424	11.6%	2,038	8.7%
Educational, health and social services:	6,701	15.2%	42,733	17.8%	5,165	17.6%	467	12.8%	3,771	16.0%
Arts, entertainment, recreation, hotel and food services:	2,875	6.5%	18,214	7.6%	1,943	6.6%	303	8.3%	1,605	6.8%
Other services (except Public Administration)	2,410	5.5%	12,369	5.2%	1,535	5.2%	158	4.3%	1,272	5.4%
Public administration	1,559	3.5%	8,969	3.7%	1,266	4.3%	169	4.6%	843	3.6%
Employed Labor Force	42,181	95.6%	229,227	95.7%	28,162	95.7%	3,491	95.8%	22,617	96.1%
Unemployed Labor Force	1,947	4.4%	10,218	4.3%	1,257	4.3%	154	4.2%	930	3.9%
Total Labor Force	**44,128**		**239,445**		**29,419**		**3,645**		**23,547**	

Source: 2000 U.S. Census Data

3.4.3.3 ENVIRONMENTAL CONSEQUENCES

Displacements that would result from the planned and programmed projects included in the No-Build Alternative would be addressed in the environmental documents for the respective projects. The Build Alternative for the proposed project would result in both residential and nonresidential relocations, as summarized in Table 3.4-9. A comprehensive description of relocation impacts is set forth in the *Draft Relocation Impact Report (DRIR)* prepared for this project.

Residential Displacement

Three residential units would be subject to relocation under the Build Alternative, as shown in Table 3.4-10. This represents less than one percent of the total occupied dwelling units in the study area. All potential residential displacements would occur in the City of Cotati and are located northeast of the Highway 101/SR 116 Interchange near the northbound Highway 101 on-ramp at Old Redwood Highway. Based on 2000 data for Census Tract 1512.03; Block 2016, approximately six residents would be relocated. Full appraisals to determine actual market value will be conducted for each property to be relocated based on current market conditions prior to acquisition.

Business Displacement

The one nonresidential relocation, as shown in Table 3.4-9, would be an automobile dealership located at the Highway 101/Old Redwood Highway Interchange within the City of Petaluma. The business employs approximately 10 people, which represents approximately 0.3 percent of the labor force in the retail industry.

The business identified for possible acquisition was subjected to a preliminary field survey to determine its general characteristics. Full assessment of the nonresidential use will be conducted prior to its acquisition to determine specific characteristics and values. The owner of the displaced business will be interviewed to determine the specific needs of this business.

Removal of this business would result in a temporary loss of sales tax revenue for the City of Petaluma. It is assumed that the business would be relocated within Petaluma and would resume payment of property-related taxes upon relocation.

Table 3.4-9: Residential and Nonresidential Relocation Under the Build Alternative

	Single Family Units	Mobile Homes	Multi-Family		Estimated Total Residential Units (Units/Residents)[1]	Nonresidential Units (Businesses/ Employees)[2]
			Buildings	Units		
TOTALS	3	0	0	0	3 / 6	1 / 10

[1] Estimate of residents based on an average of 2.00 residents per unit (2000 U.S. Census Data, Tract 1512.03; Block 2016).
[2] Estimate of employees based on a visual survey of potentially affected parcels.
Source: Parsons 2004

3.4.3.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Caltrans will observe the rights and services provided under Public Law 91-646, Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 in accordance with its own relocation assistance policies. It is Caltrans' policy that persons displaced as a result of highway programs shall receive fair and humane treatment and shall not suffer unnecessarily as a result of programs designed for the benefit of the public. A summary of relocation benefits is included in Appendix D.

Current market data (September 2005) indicate that there are adequate resources in the cities of Petaluma and Cotati to accommodate relocation of the displaced residential and nonresidential units. A full inventory of available relocation resources and a correlation with the units taken will be conducted and identified in the *Final Relocation Impact Report*.

3.4.4 Environmental Justice

3.4.4.1 REGULATORY SETTING

Executive Order (EO) 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations), dated February 11, 1994, calls on federal agencies to identify and address the disproportionately high and adverse human health or environmental effects of federal programs, policies, and activities on minority populations and low-income populations. The U.S. Department of Transportation (DOT) has published a Final DOT Order to establish procedures for use in complying with EO 12898 for its operating administrations, including FHWA. If disproportionately high and adverse impacts would result from the proposed action, mitigation measures or alternatives must be developed to avoid or reduce the impacts, unless the agency finds that such measures are not practicable.

Impacts and benefits of transportation projects result from the physical placement of such facilities, and also from their ability to improve or impede access to and from neighborhoods and other portions of the region. The environmental justice analysis examines whether ethnic minority and/or low-income populations in the project area would experience disproportionately adverse accessibility or other impacts, and if the impacts experienced by such populations would be inconsistent with the benefits created.

3.4.4.2 AFFECTED ENVIRONMENT

The project study area includes a variety of neighborhoods and a multi-ethnic population. The ethnic composition for the study area, as described in Section 3.4.1.1, is comparable to Sonoma County and the City of Rohnert Park. As shown in Table 3.4-10, the cities of Petaluma and Cotati are slightly less diverse than the study area with minority populations of 23 percent in each city. The study area, Sonoma County and the City of Rohnert Park each have a 26 percent minority population.

Table 3.4-10 also shows that the percentage of persons below poverty level is slightly higher in the study area (approximately nine percent) than for Sonoma County and the cities of Cotati and Rohnert Park.

Table 3.4-10: Minority and Low-Income Populations in the Study Area

	Study Area	Sonoma County	City of Petaluma	City of Cotati	City of Rohnert Park
% Minority	26%	26%	23%	23%	26%
% Low-Income	9%	8%	6%	8%	8%

Source: 2000 U.S. Census data

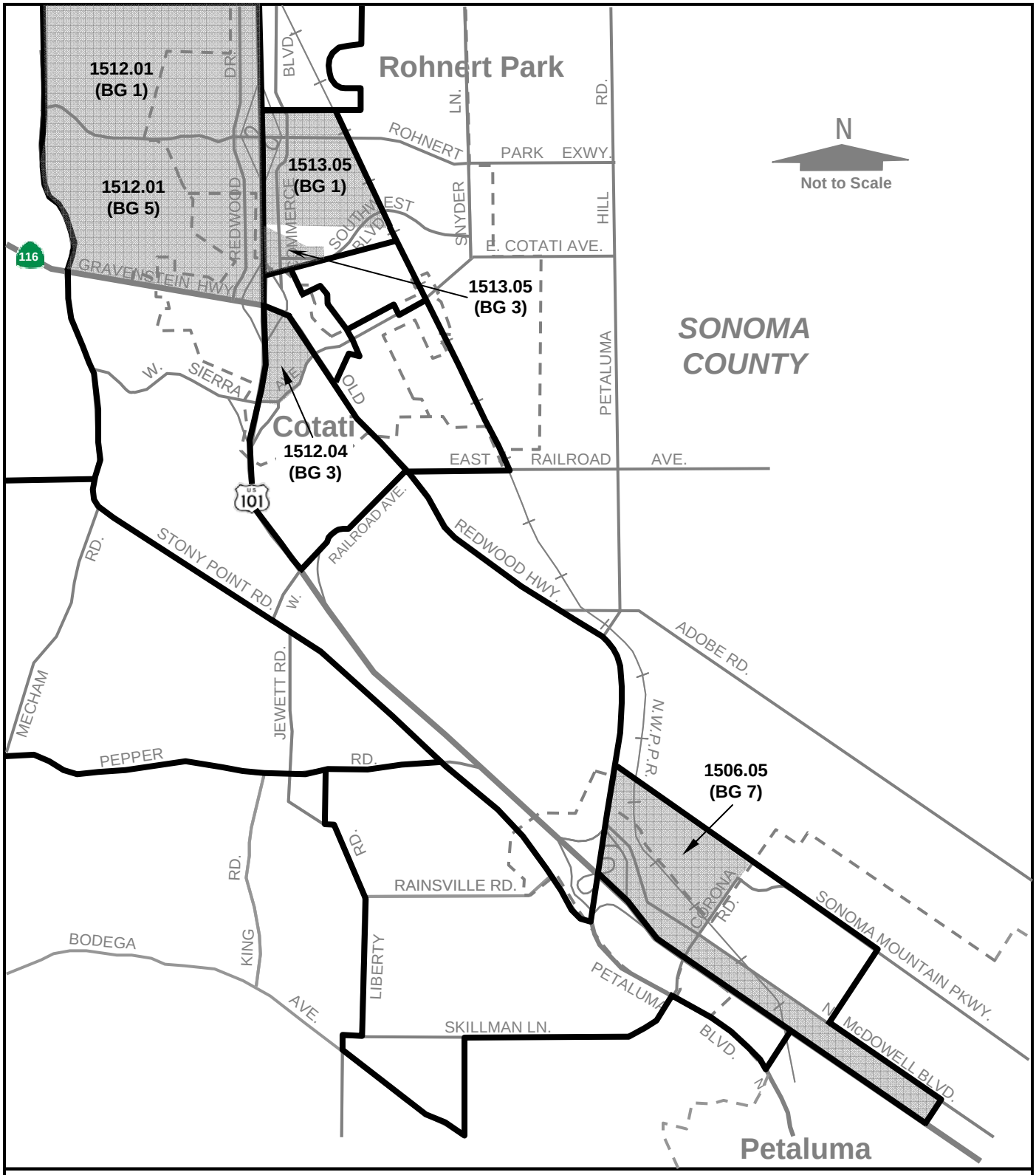
For the purposes of this analysis, the potential for environmental justice impacts was identified when the population in any census tract block group met or exceeded either of the following criteria:

1. The census tract block group contained 50 percent or more minority or low-income population; or
2. The percentage of minority or low-income population in any census tract block group was more than 10 percentage points greater than the average in the city and/or county in which the census tract block group is located.

Based on 2000 U.S. Census Data for the study area, populations in six out of 15 census block groups located adjacent to Highway 101 qualify as environmental justice communities based on income level. Low-income populations are defined as having a median household income at or below Department of Health and Human Service poverty guidelines. Environmental justice communities are shown in Figure 3.4-4.

- **Census Tract 1506.05; Block Group 7**–Located in northern Petaluma, east of the Highway 101/ Petaluma Boulevard–Old Redwood Highway Interchange, this block group has a low-income population rate of over 12 percent.
- **Census Tract 1512.04; Block Group 3–**Northeast of the Highway 101/West Sierra Avenue Interchange in the City of Cotati, the low-income population accounts for approximately 19 percent of the block group's total population.
- **Census Tract 1512.01; Block Groups 1 and 5**–Located northwest of the Highway 101/Rohnert Park Expressway Interchange, low-income households account for approximately 12 percent of the population in both block groups.
- **Census Tract 1513.05; Block Groups 1 and 3**–Southeast of the Highway 101/Rohnert Park Expressway Interchange, these block groups have the highest incidence of low-income populations with nearly 14 and 20 percent, respectively.

Given that environmental justice communities were identified within the project study area, efforts were made to ensure that these communities were notified of all public informational meetings and the public hearing for this environmental document; see Section 6.1.4, Newspaper Notices and Flyers.



S C T A

**Highway 101 HOV Lane Widening Project:
Old Redwood Highway, Petaluma to
Rohnert Park Expressway, Rohnert Park**

ENVIRONMENTAL JUSTICE COMMUNITIES
Figure 3.4-4

3.4.4.3 ENVIRONMENTAL CONSEQUENCES

The primary purpose of the proposed action is to complete the Highway 101 HOV system described by the Metropolitan Transportation Commission in the *2002 HOV Lane Master Plan Update*. The Highway 101 HOV lane widening would encourage carpooling by providing HOV lanes along the length of the project corridor and reduce energy consumption by reducing single occupancy vehicle use and idling.

As discussed in Section 3.4.4.2, low-income and minority populations are found in the project area. Because the proposed project would alter an already existing freeway, it would not divide an established community. Potential impacts to neighboring populations include added noise and displacement and relocation impacts. These are impacts typically assessed to determine if there would be disproportionate impacts on low-income or minority populations.

Environmental impacts would be distributed evenly throughout the project area and would not be concentrated in neighborhoods with minority or low-income residents. Noise abatement measures are recommended wherever noise abatement criteria are met and would be expected to prevent disproportionate impacts to any particular area. The anticipated business displacements and the three residential displacements are in areas that are not identified as low-income or minority neighborhoods. Some partial takes of nonresidential properties, primarily affecting existing parking, would also result; however, these impacts would not be concentrated in areas with environmental justice communities.

Based on the foregoing discussion, the proposed project would not cause disproportionately high and adverse effects on any minority or low-income populations as discussed in E.O. 12898 regarding environmental justice. SCTA has conducted public outreach to communicate with these communities throughout the environmental review process. Community members have provided substantive input into the current project design and construction approach, as discussed more fully in Chapter 6, Summary of Public and Agency Involvement and Tribal Coordination.

3.4.4.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Caltrans would abate the long-term noise effects of the project with soundwalls consistent with FHWA noise abatement criteria. Relocation assistance would be provided to residential and business owners in accordance with the Uniform Relocation Assistance Act. Construction phase impacts would be minimized with Best Management Practices (BMPs) to control noise and fugitive dust. Detour routes would be planned in coordination with Caltrans and the traffic departments of Petaluma, Cotati and Rohnert Park and would be noticed to emergency service providers, transit operators, and Highway 101 users in advance. These measures would serve to ensure that there would be no disproportionate adverse effects on minority and low-income residents. Impacts relating to construction are discussed in more detail in Section 3.16, Construction Impacts.

3.5 Utilities

3.5.1 Affected Environment

Utilities within the Highway 101 HOV Lane Widening Project area include:

- overhead electrical and transmission lines; and
- underground electrical, gas, water, sanitary sewer, TV/cable, fiberoptics, and telephone.

Pacific Gas & Electric Company (PG&E) provides gas and electricity service in the study area. SBC maintains the local telephone service and Comcast provides cable service.

3.5.2 Impacts

The majority of the utilities within the project area are transverse crossings that do not present conflicts to the proposed project Build Alternative. However, proposed embankment widening may require extension of existing protective casings for PG&E gas lines at three locations.

In addition, two 12 kV overhead electric lines adjacent to Commerce Boulevard and Redwood Drive, and a 200-mm (8 in.) gas line and 250-mm (10 in.) water line in the vicinity of the Commerce Boulevard/northbound on-ramp intersection would require relocation to accommodate the proposed improvements at the Highway 101/SR116 interchange.

A 400-mm (16 in.) PG&E gas line that runs parallel to the westerly right-of-way line for approximately 550 m (1,640 ft.) from a transverse crossing of Highway 101 north to Pepper Road falls within the area of proposed right-of-way acquisition for the entrance ramp improvements. This line will require relocation into a new utility easement parallel to the proposed right-of-way line.

There is an existing longitudinal encroachment of a 300-mm (12 in.) water line that runs parallel to the easterly right-of-way line for approximately 40 m (130 ft.), north of Old Redwood Highway. No changes are proposed to this utility.

Construction phase impacts are discussed in Section 3.16.5, Utilities/Service Systems.

3.5.3 Avoidance, Minimization, and/or Mitigation Measures

Design, construction, and inspection of utilities relocated for the project would be done in accordance with Caltrans requirements. Where feasible, relocations would be undertaken in advance of project construction. Caltrans would coordinate with the affected service provider in each instance to ensure that work is in accordance with the appropriate requirements and criteria. In addition, coordination with the utility providers would be initiated during the preliminary engineering phase of the project and would continue through final design and construction. Coordination efforts would plan utility re-routes, identify potential conflicts, ensure that construction of the proposed project minimizes disruption to utility operations, and formulate strategies for overcoming problems that may arise.

Measures to avoid or minimize disruptions to the emergency services and utilities during construction of the project are discussed in Section 3.16.5, Utilities/Service Systems.

3.6 Visual/Aesthetics

The *Visual Impact Assessment* (CirclePoint, June 2005) for the Highway 101 HOV Lane Widening project was conducted in accordance with the guidelines provided in the *FHWA Approach to Visual Assessment of Highway Projects* (FHWA, 1986). The visual analysis characterizes the project area in terms of "landscape units," which are distinct segments of the corridor that have a consistent or cohesive visual or physical character, and identifies visual quality, prominent features, and scenic resources within the landscape units. Selected viewpoints along Highway 101 where the project could affect existing visual quality are identified and evaluated. In addition, physical changes attributable to the proposed project that would cause changes to views currently experienced by residents, motorists and other users of the area are evaluated. Avoidance, minimization and compensation measures to address visual effects are described in Section 3.6.4.

3.6.1 Regulatory Setting

NEPA establishes that the federal government use all practicable means to ensure all Americans safe, healthful, productive and aesthetically and culturally pleasing surroundings (42 USC 4331[b] [2]). In its implementation of NEPA (23 USC 109[h]), the FHWA directs that final decisions regarding projects are to be made in the best overall public interest, taking into account adverse environmental impacts, including the destruction or disruption of aesthetic values.

Likewise, CEQA establishes that it is the policy of the state to take all action necessary to provide the people of the state "with…enjoyment of aesthetic, natural, scenic and historic environmental qualities." [CA Public Resources Code Section 21001(b)].

3.6.2 Affected Environment

The existing visual environment is characterized by the landscape components (visual resources) and viewer groups within the project area. Visual resources are described in terms of existing visual character and quality. Viewer groups are evaluated in terms of viewer exposure (the ability to see the project area), and viewer sensitivity, which refers to the viewers' concern for scenic quality and their response to change in visual resources.

3.6.2.1 EXISTING VISUAL CHARACTER AND CONTEXT

The Highway 101 HOV Lane Widening project corridor is located in Sonoma County, California, extending through the cities of Petaluma, Cotati, and Rohnert Park, and unincorporated areas within Sonoma County. The overall visual character of the project area is primarily rural, with open space/agricultural uses and mature native and non-native trees bordering the highway within the project limits, with developed areas near the city centers.

One characteristic that distinguishes Sonoma County from many parts of the San Francisco Bay Area is the continued existence of separate, identifiable cities and communities. The presence of open land helps retain the rural character and avoid corridor-style urbanization. These lands may not necessarily be highly scenic in their own right, but they provide visual relief from continuous

urbanization and are a special type of scenic border, known as a community separator. The Petaluma/Rohnert Park community separator is located within the project area on the west side of Highway 101 between the cities of Cotati and Petaluma. This separator includes Liberty Valley, an area of high visual quality.

Another distinguishing characteristic of the existing visual character of the project vicinity resides in the redwood tree clusters that line the highway. These redwood tree clusters were planted at regular intervals to reinforce motorists' perception of the regional landscape character and what was to be established as the "Redwood Highway." Over the years they have become a dominant visual element of the highway corridor.

3.6.2.2 EXISTING VISUAL IMAGE TYPES AND VIEWER GROUPS

For the purposes of the visual impact assessment, the study area was subdivided into two landscape units that encompass distinct spatial areas, the Southern Landscape Unit and the Northern Landscape Unit, as described in Section 3.6.2.3. Each landscape unit has a distinct visual character based upon the land uses and features that comprise it. These smaller scale land uses or features within each landscape unit are called "image types." Nine visual image types are located within the project area: mature trees, including the redwood tree clusters planted to establish Highway 101 as the "Redwood Highway," agricultural, vineyard, residential, institutional/religious, commercial, industrial/ manufacturing, hillsides/distant hills, and recreational.

"Viewer groups" are groups of people who regularly travel through the project area, or who have a certain degree of sensitivity to changes in the visual environment. Viewer groups may be present in some landscape units and not in others, as land uses and travel patterns may vary between landscape units within the project area. Three viewer groups were identified within the project area: 1) motorists who use Highway 101 and/or other local streets in the project vicinity as regional roads for commuting or commerce; 2) residents who have views of Highway 101 from properties along the project corridor; and 3) agricultural employees who have views of Highway 101 from farms along the project corridor.

3.6.2.3 LANDSCAPE UNITS

The project corridor is divided into two landscape units (see Figure 3.6-1): the Southern Landscape Unit (Southern LU) and Northern Landscape Unit (Northern LU). Each landscape unit was determined based on visibility from other landscape units within the project area, topographical features, or other distinguishing features. The existing visual quality of the landscape units, including image types encompassed within each landscape unit, and viewer groups with a degree of sensitivity to the visual environment are described below and shown in Table 3.6-1.

S C T A

Highway 101 HOV Lane Widening Project:
Old Redwood Highway, Petaluma to
Rohnert Park Expressway, Rohnert Park

LANDSCAPE UNIT LOCATIONS
Figure 3.6-1

Southern Landscape Unit: The Southern Landscape Unit (Southern LU) includes the southern segment of the Highway 101 project corridor from Old Redwood Highway to West Sierra Avenue. Visual resources within the Southern LU include large hilltop estates surrounded by expansive front lots, agricultural fields, rolling hills dotted with grazing livestock, and distant wooded hillsides. Approximately 1,197 large and mature trees (trunks greater than 25 cm [10 in] in diameter at breast height) are located along Highway 101 at various locations in the Southern LU. Of these mature trees, approximately 1,073 are redwoods. These trees, although non-native, have become a dominant visual element of the roadside environment.

Existing visual quality at the southern end of the landscape unit near Old Redwood Highway is urbanized with industrial/commercial buildings on the east side of Highway 101. On the west side of the corridor, a row of trees screens a trailer park. A driving range is located just south of the trailer park. Large wooden utility poles are distinct visual elements along this segment of the corridor.

Heading north along Highway 101, the Southern LU becomes more rural with wide open views of agricultural land, dotted with farmhouses, barns and mature oak groves. The bucolic views of Liberty Valley and the rural character of the City of Cotati result in high visual quality within this landscape unit. Some residences on the hillsides in the distance are visible through dense woodland. Mature landscaping increases as the corridor approaches the northern limits of the Southern LU at West Sierra Avenue. Visual resources along this segment of Highway 101 include hills with vineyards and large residences, partially obscured by dense trees and foliage.

Table 3.6-1: Summary of Landscape Units

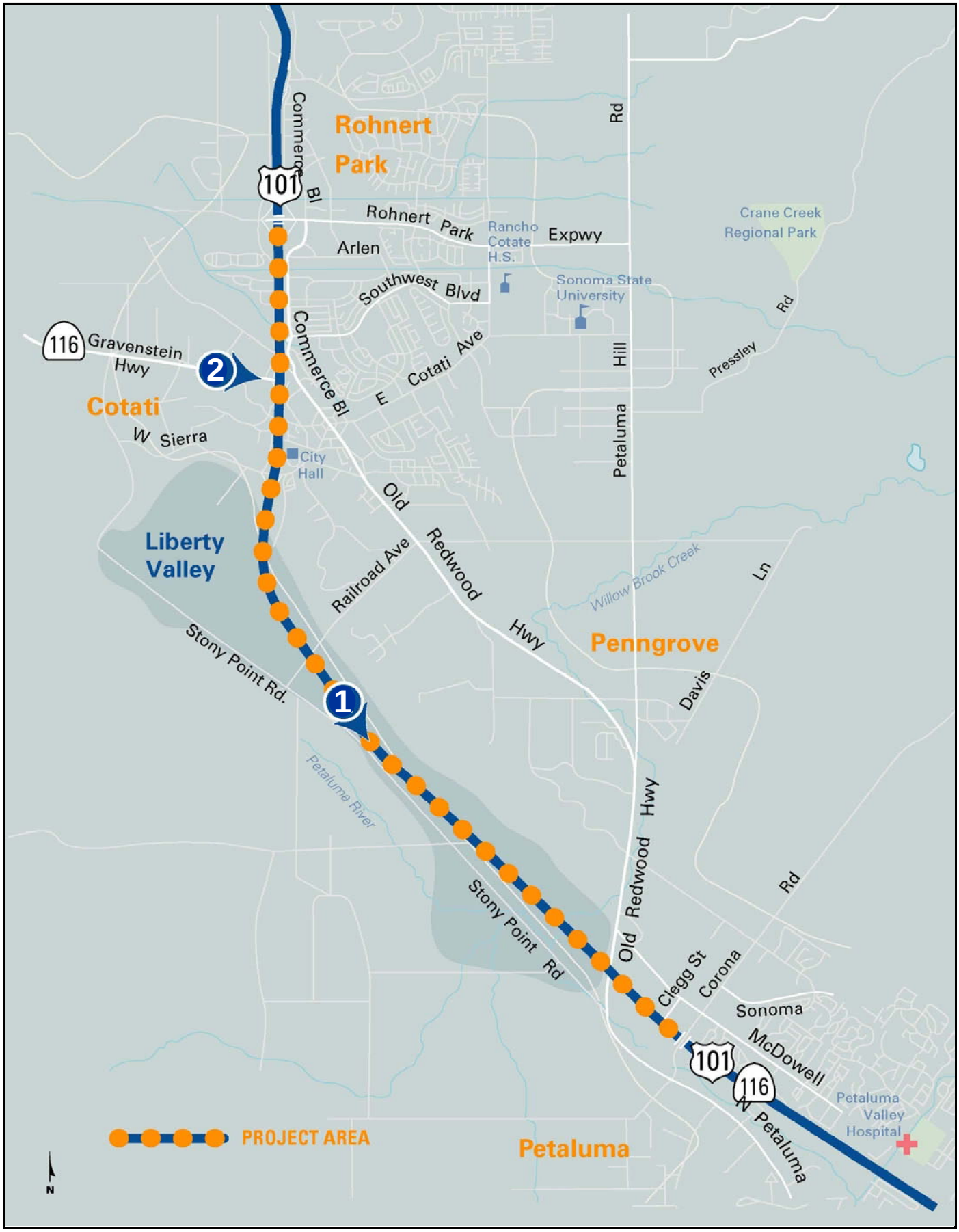
Landscape Unit	Description	
Southern	Image Types	Mature Trees (including redwoods and Valley oaks), Agricultural, Vineyard, Residential, Industrial/Manufacturing, Hillsides/Distant Hills, Recreational
	Viewer Groups	Motorists, Residents, and Agricultural Employees
	Visual Resources	Golf course/driving range on south end of landscape unit, open agricultural land and associated farmhouse structures. Cows graze on hillsides along highway, distant rolling hills visible throughout, and residences on large plots of land dot hillsides.
	Overall Visual Character	Rural area with farmhouses and rolling hills on north end of LU, transitioning to more industrial uses and more mature vegetation screening the highway from areas near Old Redwood Highway on south end.
Northern	Image Types	Mature Trees, Vineyard, Residential, Institutional/Religious, Commercial, Industrial/Manufacturing
	Viewer Groups	Motorists, Residents, and Agricultural Employees
	Visual Resources	Mature vegetation along 101, church steeple visible through vegetation along highway. Commercial, industrial, and residential uses, particularly on the north end of this landscape unit east of the highway.
	Overall Visual Character	Wooded corridor, mature vegetation screens much of the development along the highway.

Northern Landscape Unit: The Northern Landscape Unit (Northern LU) includes the northern segment of the Highway 101 project corridor, from West Sierra Avenue to the Rohnert Park Expressway. The dominant visual characteristic of the southern portion of the Northern LU is the dense screening provided by mature native and non-native trees and grassy berms along both sides of Highway 101. Approximately 1,174 large and mature trees are located along Highway 101 at various locations in the Northern LU. Of these mature trees, approximately 1,074 are redwoods, which as previously noted, have become a dominant visual element of the roadside environment. These trees screen motorist views of the commercial, industrial and residential uses adjacent to the highway alignment. Existing land uses are visible through breaks in the screening and over the tops of some of the smaller trees. At the southern limit of the landscape unit, views of a small vineyard west of Highway 101 are apparent. Heading north, a church steeple is visible above the tall trees on the east side of the freeway, creating a unique visual image. The extreme northern end of the landscape unit contains less screening and more of the adjacent land uses are visible. Visual quality in this segment is medium, overall.

Existing Visual Quality

Key viewpoints, as shown on Figure 3.6-2, were identified to represent the visual character of the landscape units and used to define visual quality. The existing visual quality for each of the landscape units was evaluated based on indicators of the level of visual relationships, rather than judgments of physical landscape components. This approach provides a set of three evaluative criteria: vividness, intactness, and unity. These criteria are defined as follows:

> **Vividness** is the visual power or memorability of landscape components as they combine in striking and distinctive visual patterns.
>
> **Intactness** is the visual integrity of the natural and man-made landscape of the immediate environs and its freedom from encroaching elements.
>
> **Unity** is the visual coherence and compositional harmony of the viewshed. The viewshed entails all natural and man-made features found within the normal view range. In man-altered landscapes, it frequently attests to the careful design or fit of individual components in the landscape.



S C T A

Highway 101 HOV Lane Widening Project:
Old Redwood Highway, Petaluma to
Rohnert Park Expressway, Rohnert Park

VIEWPOINT LOCATIONS
Figure 3.6-2

The key viewpoints are typical views that people would have of or from the project, as described below. Table 3.6-2 provides a summary of the existing visual quality for each viewpoint.

Table 3.6-2: Summary of Existing Visual Quality

Viewpoint Number	Setting	Vividness	Intactness	Unity	Overall Visual Quality
1	Looking south at approximately STA 67+00	High	Medium	Medium	High
2	Looking east at the 101/116 interchange	Medium	Medium	Medium	Medium

Viewpoint 1

This viewpoint is looking south along Highway 101 towards the Petaluma/Rohnert Park community separator, at approximately Station 67+00, as shown below. In this view, Highway 101 begins with a decrease in elevation then rises over a hill, extending straight towards the hills in the distance. Mature trees and grassy hills line both sides of the freeway and a grassy median with metal guardrails is located between the northbound and southbound travel lanes. Motorists traveling on Highway 101 are the primary viewer group in this area.

Visual quality in this segment is characterized by the natural landscape, as it represents the rural character of the area. The scattered trees that run parallel to the freeway blend with the surrounding trees of varying sizes and types in the area. The combination of trees and hills although interrupted by the freeway create a highly vivid scene with medium intactness and unity, resulting in a high overall visual quality rating.

Viewpoint 1

Viewpoint 2

This viewpoint is looking east toward the Highway 101/SR 116 interchange from SR 116 (Gravenstein Highway), as shown below. Large redwood trees surround the Highway 101 overpass, screening views of the rest of the freeway. These redwoods were planted in clusters to reinforce motorists' perception of the regional landscape character and to establish Highway 101 as the "Redwood Highway." The ridgeline of the Sonoma Mountains is visible in the distance. Motorists traveling on SR 116 and local residents are the primary viewer groups in this area.

Visual quality in this segment is characterized by mature trees that parallel Highway 101. The Highway 101 overpass is perpendicular to the at-grade roadway, and creates a visual break in the row of trees, disrupting the continuity of the mature tree image type that is otherwise relatively consistent in size and scale. The break in the image type reduces the intactness and unity of the view; however, the mature landscaping and the ridgeline in the distance create a vivid scene resulting in a medium overall visual quality rating.

Viewpoint 2

3.6.3 Environmental Consequences

The following section analyzes the visual impacts of the proposed project within the two landscape units that make up the project study area. The methodology used to assess visual impacts combines the two principal visual impact components: visual resource change and viewer response to that change. "Visual resource change" is analyzed in terms of visual dominance and other visual effects of facilities that would be constructed under the proposed project, together with the change in visual quality. "Viewer response" to these changes is interpreted on the basis of the viewer types identified.

The ratings used for determining the extent of impacts are defined as follows:

Low or negligible impacts are minor adverse changes to the existing visual resource, with low viewer response to change in the visual environment.

Slightly adverse impacts are slightly detectible within a localized area with increased viewer response.

Medium impacts are those that are readily apparent with moderate viewer response.

High impacts are highly detectible and would be substantial with a high viewer response level.

3.6.3.1 VISUAL RESOURCE CHANGE

Visual changes as a result of the Build Alternative in the Southern and Northern landscape units are described in this section. Boundaries for both landscape units are provided and their primary visual resource features are described in Section 3.6.2.3, Landscape Units.

Southern Landscape Unit: Visual changes due to realignment of interchange ramps at Old Redwood Highway would generally be negligible.

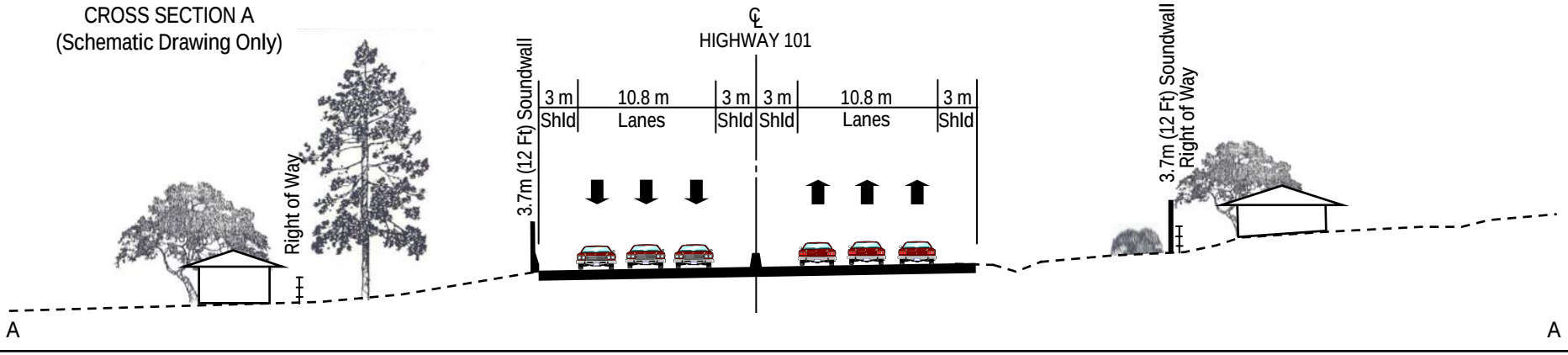
Grading of some of the rolling hills at the top of the incline near Railroad Avenue would be necessary to accommodate the widened shoulders and westward shift of the highway. This grading would be visible to both motorists and residents in the Liberty Valley area and would result in adverse impacts to the visual environment. Additional fill would be placed along the west facing slope of Cotati Grade. All material would be placed within the existing fill slope and the resulting land contour would be similar to the existing landform. Grading changes would be most noticeable immediately following construction; the visual impact would be negligible following maturation of the plants on the re-vegetated slope.

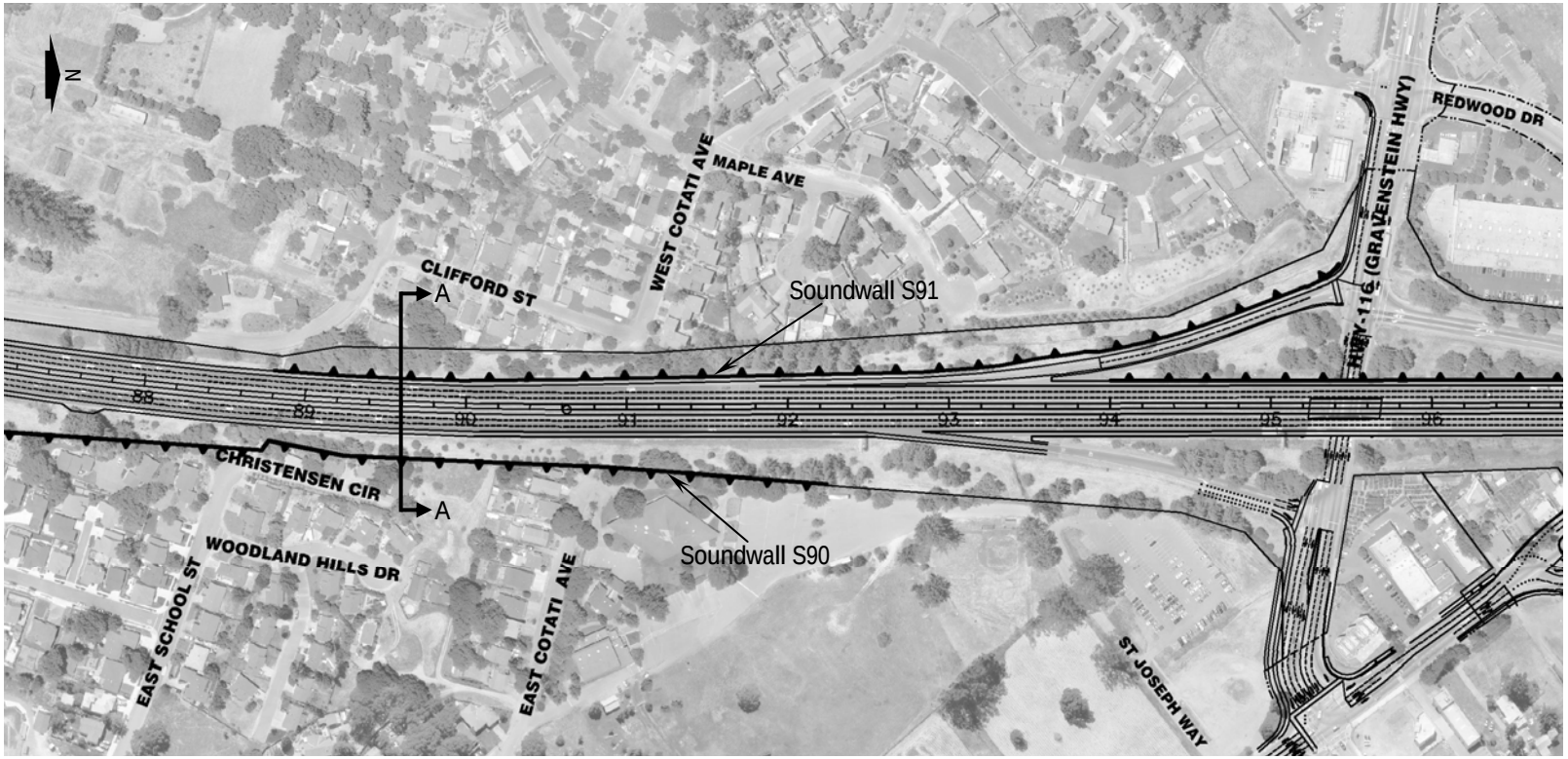
To accommodate the HOV lane widening and recommended soundwalls, approximately 289 large and mature trees and other vegetation would require removal, primarily from within the northern portion of the Southern Landscape Unit. This would include removal of redwood trees near West Sierra Avenue. Of these mature trees, 280 are redwoods. Loss of these trees would adversely affect the landscape character of the highway and the aesthetics of the driving experience.

Soundwalls would be constructed in two locations within this landscape unit: north of Old Redwood Highway and north from Issel Court to West Sierra Avenue. The removal of some of the roadside landscaping north of Old Redwood Highway along the west side of Highway 101 within the right-of-way to construct the first of these two soundwalls, for the Leisure Lake Mobile Home Park community, would have only a negligible visual impact. The soundwall would be located at the roadway shoulder, and most of the redwood trees stand west of the shoulder outside the project limits. Therefore, the vegetation would continue to screen trailer park residents' views of the highway as well as of the soundwall.

A retaining wall associated with some roadside grading would be constructed in this vicinity, and the second soundwall would be built at the shoulder on the east side of the highway near Issel and Benedetti Courts. Construction of these walls would require the removal of vegetation and would detract from the rural character of the landscape unit. As shown in Figure 3.6-3, the visual prominence of soundwalls would relate to viewer proximity—that is, the farther away a viewer is from a soundwall, the less visually dominant it would appear. The new soundwalls would thus be more apparent to residents of Issel or Benedetti Courts than to those of Leisure Lake. The soundwalls would also be visually dominant to motorists traveling along Highway 101. On the other hand, soundwalls also help to screen residents' views of the highway.

Overall, the removal of mature vegetation and construction of soundwalls to mitigate noise impacts would have adverse impacts to the visual environment, decreasing the wooded, rural character of some of the areas within the Southern Landscape Unit. The visual dominance of Highway 101 through this landscape unit would increase slightly as a result of the highway and bridge widening, but would not affect viewer orientation or disrupt existing communities, since the highway would basically remain in its current alignment. Specific mitigation proposed to address the removal of mature trees and other vegetation and to soften the appearance of the highway facilities is described in Section 3.6.4, Avoidance, Minimization, and/or Mitigation Measures.





TYPICAL SOUNDWALL CROSS-SECTION
Figure 3.6-3

Northern Landscape Unit: To accommodate the HOV lane widening, approximately 115 large and mature trees and other vegetation within the highway corridor would be removed from this landscape unit. Of these mature trees, 107 are redwoods. Removal of redwood trees would constitute an adverse impact on the landscape character of the highway and the aesthetics of the driving experience within this landscape unit. In the southern portion of the landscape unit, from West Sierra Avenue northward to about Highway 116, removal of trees and vegetation would occur on both sides of the highway. In the northern portion of the landscape unit, north of Highway 116, vegetation loss would occur primarily on the west side of the highway. Removal of vegetation would decrease the existing visual buffer between the highway and the adjacent land uses.

The project proposes to construct soundwalls at several locations within this landscape unit: on the east side of Highway 101 from south of West Sierra Avenue to north of East Cotati Avenue; on the west side of the highway from south of West Cotati Avenue through the Highway 116 interchange; and on the east side of Highway 101 from about Arlen Drive to Copeland Creek. A concrete barrier would be installed on the west side of the highway from Helman Lane to about Copeland Creek. The removal of vegetation and addition of soundwalls and the concrete barrier would result in an adverse effect on views from the adjacent land uses to the roadway by decreasing the rural character of the highway corridor. It should be noted that the area surrounding the proposed barrier is already urbanized. As shown in Figure 3.6-3, the visual effects would decrease with viewer distance from the soundwalls.

Under Interchange Option B, the profile of Highway 101 going over Highway 116 (Gravenstein Highway) would be raised between one and two meters (approximately 7+ feet). The raised area would be primarily limited to within the existing interchange ramps, but would be visible to residents on the west side of the highway and to churchgoers on the east side. The primary visual impact would be to motorists traveling along Highway 116. The raised Highway 101 profile would emphasize the visibility of the soundwall through the Highway 116 Interchange, blocking views of the distant hillsides from that roadway. This effect is shown in Figure 3.6-5. These various interchange modifications would have an adverse effect on the community image as a whole by decreasing screening vegetation, increasing reflective light, and generally contributing to a more urbanized feel for motorists on Highway 116. On the other hand, the roadway view for Highway 101 motorists would be smoother and more continuous. Visual changes due to realignment of Highway 116 interchange ramps would be negligible.

Construction of soundwalls and the concrete barrier requiring removal of roadside vegetation would result in an adverse effect for all viewer groups by reducing the wooded, rural character of the highway. The visual dominance of Highway 101 through the Northern Landscape Unit would increase slightly as a result of the HOV lane and bridge widening, but this would not affect viewer orientation or disrupt existing communities, as the highway would remain in its current alignment. Specific mitigation for these visual impacts is described in Section 3.6.4, Avoidance, Minimization, and/or Mitigation Measures.

Visual Resource Change Summary: As described in the foregoing sections, the proposed HOV lane widening project would involve limited grading and placement of fill along the existing highway alignment, realign interchange ramps, construct soundwalls and retaining walls, modify the contour of the west facing slopes at the Cotati grade, raise the profile of the Highway 101/116 interchange, and require the removal of mature trees and vegetation. These various modifications would alter existing views and visual resources, increasing the visual dominance of Highway 101 somewhat for residents and agricultural employees, and changing the rural landscape character of the roadway for motorists. Cuts and fills would generally follow the existing highway grading. Visual impacts from such landform modifications and from realignment of interchange ramps are not expected to be substantially adverse. No widening or realignment of surface streets is anticipated. Widening of the Highway 101 structure over West Sierra Avenue and of the Highway 116 approach to the Old Redwood Highway intersection would also not have adverse visual impacts.

The primary change that would be noticeable to all viewer groups would be the removal of mature trees—including redwood trees—and other mature vegetation. Concerted efforts were made during preliminary engineering to reduce the loss of mature trees. Only those trees that would be displaced by the widened roadway facilities or soundwalls, or those trees that would be too close to the traveled way after widening to provide adequate safety clearances, would be removed. Of a total of approximately 7,493 trees enumerated along the highway within the project limits, up to 404 mature trees would be removed. About 387 of the trees indicated for removal are redwoods; this number represents about 13 percent of the 3,048 total redwood trees along Highway 101 within the project limits. These redwood trees are outside of their biological range, do not provide habitat, and do not support redwood populations, however, they are considered important aesthetic resources. These redwoods were planted in clusters along Highway 101 to establish its character as the "Redwood Highway."

The numbers presented here represent "worst case" estimates of tree loss. Efforts would continue throughout the final design phase of the project to reduce the number of trees that would be affected. Avoidance, minimization and mitigation measures are described in Section 3.6.4. Anticipated effects of the project on Valley oak trees are reported with their proposed avoidance, minimization and mitigation measures in Section 3.15, Biological Environment.

Highway 101 in the area of the proposed project is not a designated State Scenic Highway; however, segments of Highway 101 within the project limits are highly scenic. Views to the Sonoma Mountains and Liberty Valley would remain after implementation of the project. The proposed project would not introduce new sources of light to the project area. Construction of soundwalls would, however, introduce a new source of reflective light; thereby contributing to glare.

3.6.3.2 VISUAL CHANGES AND EFFECT ON VIEWER GROUPS

The following section discusses the impacts of the proposed project at the two viewpoints described in Section 3.6.2.3, Landscape Units.

Viewpoint 1

As shown in Figure 3.6-4, highway widening to accommodate an HOV lane at this location would extend into the existing open space to the west. A solid center median would also be added. The widening would slightly increase the visual dominance of the highway, and the center median would likely reduce to some degree views for northbound motorists, but would not substantially obstruct views to the surrounding vistas. The wider highway would slightly affect the intactness and unity of the view but would not have a noticeable affect on the view's vividness. Since the surrounding natural landscape would remain, the proposed project would result in a minor adverse change in the overall visual quality of the view (see Table 3.6-3).

Table 3.6-3: Overall Visual Quality Change from Viewpoint 1

Alternative	Visual Dominance of Highway 101	View Obstruction	Community Disruption/ Orientation/ Privacy	Vividness	Intactness	Unity	Overall Visual Quality
Existing/ No Build	Medium	Low	Low	High	Medium	Medium	High
Change with Proposed Project	Slightly Adverse	Negligible	Negligible	Negligible	Slightly Adverse	Slightly Adverse	Slightly Adverse

Existing Condition / No Build Alternative

Visual Change with Project

Viewpoint 2

Visual changes at Viewpoint 2 would occur under three options proposed for the Highway 101/SR 116 Interchange: Option A, Option B (Raised Profile/No Soundwall), and Option B (Raised Profile/With 16-Foot Soundwall), as described below and shown in Figure 3.6-5. Table 3.6-4 describes the overall visual quality change from Viewpoint 2.

Build Alternative, Option A (Soundwall) would construct a 4.9-m (16-ft) high soundwall along Highway 101. The wall would be made of textured concrete with a border on the top. The soundwall would increase the visual dominance of Highway 101 and completely obstruct the view of the ridgeline of the Sonoma Mountains from SR 116. The obstruction of the ridgeline would adversely affect the intactness and unity of the view, as the ridgeline provides a visual connection between the two groups of mature trees. This also would reduce the vividness and overall visual quality of the view.

Build Alternative, Option B (Raised Profile/No Soundwall) would raise the profile of Highway 101 at the interchange. This would require modifying the existing abutments and removing many mature trees, making Highway 101 the dominant visual element of the view. Views of the ridgeline would open due to the removal of mature trees along the overpass and ramps; however, the roadway would become a more dominant visual element in the view. The overall visual impact would result in minor adverse changes to the vividness, intactness, unity and overall visual quality of the view. Additionally, this option would not contribute to increases in glare from soundwall construction materials.

Build Alternative, Option B (Raised Profile/With 16-Foot Soundwall) would raise the profile of Highway 101 at the interchange by modifying the existing abutments and removing mature trees, and would also construct a 4.9-m (16-ft) high soundwall along Highway 101. The wall would be made of textured concrete with a border on the top. The addition of a soundwall atop the raised highway would further increase the visual dominance of Highway 101 and completely obstruct the view from SR 116 to the ridgeline of the Sonoma Mountains. The physical removal of the trees and the obstruction of the Sonoma Mountains ridgeline from the view would result in substantial adverse changes to the vividness, intactness and overall visual quality of the view.

Table 3.6-4: Overall Visual Quality Change from Viewpoint 2

Alternative	Visual Dominance of Hwy 101	View Obstruction	Community Disruption/ Orientation/ Privacy	Vividness	Intactness	Unity	Overall Visual Quality
Existing/ No Build	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Change with Proposed Project (Option A)	Strongly Adverse	Strongly Adverse	Negligible	Adverse	Adverse	Adverse	Adverse
Change with Proposed Project Option B (No Soundwall)	Strongly Adverse	Negligible	Negligible	Slightly Adverse	Slightly Adverse	Slightly Adverse	Slightly Adverse
Change with Proposed Project Option B (With 16-foot Soundwall)	Strongly Adverse	Strongly Adverse	Adverse	Strongly Adverse	Strongly Adverse	Strongly Adverse	Strongly Adverse

Existing Condition / No Build Alternative

Option A: 16 ft. Soundwall

Option B: Raised Profile/No Soundwall

Option B: Raised Profile/16 ft. Soundwall

As shown in Figure 3.6-5, Option B would slightly increase the adverse effect on scenic vistas for viewers close to the soundwall. As compared to Option A, the Option B soundwall would be slightly more visible from the heavily traveled Gravenstein Highway due to the increased profile of Highway 101. Similar to Option A, this impact would diminish in intensity with distance from the soundwall and would not be considered substantial. The soundwall would also contribute to a more urbanized feel for viewers in the vicinity of Highway 101 due to a reduction in screening vegetation and the soundwall structure itself. The soundwall materials would also become a new source of reflective light contributing to glare. The soundwall would not contribute to nighttime light; therefore, there would be no impact to nighttime views in the area.

3.6.3.3 CONSISTENCY WITH SCENIC/VISUAL RESOURCE PLANS AND POLICIES

The General Plans for Sonoma County and the cities of Petaluma, Cotati and Rohnert Park set forth scenic/visual resource goals and policies intended to preserve, enhance, restore and respect scenic vistas and visually important landscapes in each jurisdiction. The proposed project would be generally consistent with relevant scenic/visual resources policies, or mitigation would be applied to make it consistent, as shown in Table 3.6-5 below.

Table 3.6-5: Consistency with Scenic/Visual Resource Plans and Policies

Rohnert Park General Plan	
Goal CD-D: Preserve and enhance views of the eastern ridgeline. Views of the eastern ridgeline should be preserved from the existing neighborhoods, and should be emphasized in the orientation and design of new public spaces and streets.	*Consistent.* The project would not result in a visual impact to the eastern ridgeline of Rohnert Park. In addition, the removal of some vegetation may open views of the ridgeline for motorists traveling along Highway 101 southbound traveling toward Petaluma.
Goal CD-E: Preserve and enhance the visual character of scenic corridors.	*Consistent.* Although this portion of Highway 101 is not designated as a scenic corridor, portions of Highway 101 within the project limits are highly scenic. The project would not result in an adverse visual impact to scenic corridors within the City of Rohnert Park, as most of the grading and vegetation removal associated with the project would occur along the Highway 101 corridor just to the north of Petaluma.
Goal OS-A: Maintain a greenbelt around the city that provides a physical and visual space between Rohnert Park-Cotati and Santa Rosa, Petaluma, and Penngrove.	*Consistent.* The project would not result in a substantial impact to the number of acres of open space and agricultural land located on the southern border of the City and northern boundary of Petaluma, and therefore, it would not result in a significant visual change to the existing greenbelt.
Goal OS-B: Maintain land surrounding the city as open space for the enjoyment of scenic beauty, recreation, and protection of natural resources of the community.	*Consistent.* See above.
City of Petaluma General Plan	
Opportunity 5: A key to Petaluma's identity is the rural and agricultural character of its setting. Urban separators are already in place to the northwest, northeast, and southeast of the City, and care should be taken to preserve the rolling hills surrounding it to the	*Potentially Inconsistent.* The project would involve grading, the removal of some mature vegetation, and construction of soundwalls along the Highway 101 corridor. This would result in a potentially adverse impact to the visual character of the rural, wooded areas.

Table 3.6-5: Consistency with Scenic/Visual Resource Plans and Policies

southwest as well.	
City of Cotati General Plan	
Objective 12.1: Establish and maintain visual breaks between Cotati and Rohnert Park, Cotati, and Petaluma, and Cotati and Sebastopol.	*Consistent.* The project would not result in a substantial loss of acreage between the cities, and would therefore not visually affect the community separator between these cities.
Objective 13.1: Cotati's scenic natural resources shall be preserved and development adjacent to these resources shall be visually unobtrusive and environmentally compatible.	*Potentially Inconsistent.* The removal of mature vegetation and construction of soundwalls within the corridor would affect the scenic natural resources of the corridor, resulting in an adverse visual impact unless mitigation is incorporated.
Objective 13.2: Improve the visual character along Cotati's roads.	*Potentially Inconsistent.* The removal of mature vegetation and construction of soundwalls within the corridor would affect the rural character of the corridor, resulting in an adverse visual impact unless mitigation is incorporated.
Policy 13.2.1: Improve landscaping along Cotati's roads.	*Potentially Inconsistent.* The removal of mature vegetation and construction of soundwalls within the corridor would affect the rural character of the corridor, resulting in an adverse visual impact unless mitigation is incorporated.
Sonoma County General Plan	
Goal OS-1: Preserve the visual identities of communities by maintaining open space areas between cities and communities.	*Consistent.* The project would not result in a substantial loss of acreage between the urbanized areas of Rohnert Park and Petaluma, and would therefore not visually affect the greenbelt separator between these cities.
Objective OS-1.1: Preserve important open space areas in the community separators shown on Figures OS-5a through OS-5i of the Open Space Element.	*Consistent.* The project would not result in increased development within the community separators, and would not affect the amount of open space between urbanized areas of neighboring cities.
Objective OS-1.2: Retain a rural character and promote low intensities of development in community separators. Avoid their annexation or inclusion in spheres of influence for sewer and water service providers.	*Consistent.* See above.
Objective OS-1.4: Preserve existing specimen trees and tree stands within community separator areas.	*Potentially Inconsistent.* The removal of mature vegetation would result in an adverse visual impact to the visual separator (the Highway 101 corridor) within the project area, unless mitigation is incorporated.
Goal OS-2: Retain the largely open, scenic character of important scenic landscape units.	*Potentially Inconsistent.* The removal of mature vegetation and construction of soundwalls within the project area would affect the rural character of the corridor, resulting in an adverse visual impact unless mitigation is incorporated.
Goal OS-3: Identify and preserve roadside landscapes which have a high visual quality as they contribute to the living environment of local residents and to the county's tourism economy.	*Potentially Inconsistent.* The removal of mature vegetation and construction of soundwalls within the project area would affect the roadside landscapes of the corridor, resulting in an adverse visual impact unless mitigation is incorporated.
Goal RC-4: Preserve, sustain and restore forestry resources for their economic, conservation, recreation, and open space values.	*Potentially Inconsistent.* The removal of mature vegetation along the highway would result in both increased visual exposure of the highway to adjacent land uses, as well as an impact to forestry resources in the project area unless mitigation is incorporated.

3.6.4 Avoidance, Minimization, and/or Mitigation Measures

It is Caltrans policy to replace vegetation damaged or removed due to highway improvement projects. A landscaping replacement plan would be implemented and replacement trees planted. The landscape replacement plan would be developed by Caltrans with input from Sonoma County and the cities of Petaluma, Cotati, and Rohnert Park to identify appropriate and feasible locations and species of trees for replacement within or near the project limits. Such replacement locations must meet safety requirements for sight distances, in addition to providing favorable conditions for tree establishment and survival. The following mitigation measures are proposed to reduce visual effects of the Build Alternative.

- Trees would be replaced at a ratio of 1:1 (for 15 gallon containerized stock). This ratio and/or size may be increased based on consultation between Caltrans and the other agencies.
- Species, size, precise number, location, and spacing of replacement trees would ultimately be determined by Caltrans Office of Landscape Architecture at a future phase of the project.
- The landscape replacement plan would include landscaping and design elements, such as architectural treatments on soundwalls that would restore the corridor's existing visual quality to the extent feasible. Where feasible, vines would be planted and allowed to grow on the walls to help visually integrate them with the overall landscape and to reduce the incidence of graffiti. New retaining walls would also be given aesthetic treatment.
- A three-year plant establishment period would be implemented.
- All disturbed areas will be re-vegetated according to Caltrans standards.
- Black vinyl clad chain link fence shall be installed on top of the proposed concrete barrier left of ML Line Station 99+20 to 109+00. A 12-18-inch wide plantable area will be provided between the concrete barrier and the frontage road to plant vines along the frontage road side of the barrier.
- Design exceptions will be prepared to:
    1. Reduce the width of the standard "catch line" to minimize the loss of existing desirable vegetation.
    2. Install guardrail around selected existing redwood tree groupings to retain the corridor image of being the "Redwood Highway."
- Trees shall be planted within cut/fill slope transitional areas to break up the appearance of engineered slope planes.
- Provide slope rounding on cuts and fills for a more natural appearance.
- Provide aesthetic surface treatments to structures that are consistent with the corridor-wide master plan (to be developed).
- Redwood tree clusters shall be reestablished along the corridor.

Additional avoidance and minimization measures to be implemented during the construction phase of the project are discussed in Section 3.16.6, Visual/Aesthetics.

3.7 Cultural Resources

As used in this document, "cultural resources" refers to archaeological and historical resources including, but not necessarily limited to, districts, sites, buildings, structures, and objects. This section of the environmental document discusses the studies performed to identify and evaluate the potential for impacts to such resources.

3.7.1 Regulatory Setting

The primary federal laws dealing with archaeological and historic resources include:

National Historic Preservation Act of 1966 [16 U.S.C. 470 et seq.]:

The National Historic Preservation Act (NHPA), as amended, sets forth national policy and procedures regarding historic properties included in or eligible for the National Register of Historic Places (NRHP). Section 106 of the NHPA requires federal agencies to consider the effects of their undertakings on such properties, following regulations issued by the Advisory Council on Historic Preservation (36 CFR §800).

National Environmental Policy Act of 1969 [42 U.S.C. 4321 et seq.]:

The National Environmental Policy Act (NEPA), the broad environmental law that applies to federal agencies and their activities, includes the preservation of important historic, cultural, and natural aspects of our national heritage within its general policy for environmental protection. Meeting the requirements of Section 106 and the NEPA regulations (40 CFR §1500-1508.28) are separate compliance efforts that require coordination. The Section 106 compliance documents that are prepared to meet the requirements of the National Historic Preservation Act also provide the basis for the required assessment of cultural resources, project alternatives, and historic property impacts in the environmental document prepared pursuant to NEPA.

U.S. Department of Transportation Act of 1966 (49 U.S.C. 303 Section 4[F]):

Transportation projects must comply with the provisions of Section 4(f) of the U.S. Department of Transportation Act (23 CFR §771). Section 4(f) applies to U.S. Department of Transportation projects that involve the "use" (either actual take of land or a less tangible "constructive use") of land from historic properties. A Section 4(f) evaluation, which requires documentation of completion of the Section 106 process, must demonstrate that there is no prudent and feasible alternative to the use, and that all possible planning has been done to minimize harm to Section 4(f) protected resource(s).

California Environmental Quality Act of 1970 (CEQA) [PRC §21000 et seq.]:

Cultural resources are protected by the California Environmental Quality Act (CEQA) (PRC Division 13, Sections 21000-21178), which requires state and local agencies to take into consideration the environmental effects of their actions. Cultural resources that are listed on or determined to be

eligible for listing on the NRHP and/or the California Register of Historic Resources (CRHR), as well as city-designated historic resources are protected under CEQA.

Public Resources Code (PRC §5024.1):

Public Resources Code §5024.1 established the California Register of Historic Resources, a listing of historic properties within the state. Section §5024.5 requires state agencies to provide notice to and to confer with the State Historic Preservation Officer (SHPO) before altering, transferring, relocating, or demolishing state-owned historical resources.

3.7.2 Affected Environment

3.7.2.1 ARCHAEOLOGICAL RESOURCES

Archaeological resources possess both scientific and cultural values. The specific site locations are confidential in order to deter vandalism and desecration. Therefore, only generalized locations associated with the proposed project are provided in this section.

In accordance with both Section 106 of the National Historic Preservation Act and CEQA, Caltrans commenced archaeological investigations by delineating an archaeological Area of Potential Effect (APE) to include the maximum anticipated project footprint for areas that may be disturbed by the proposed project (see Appendix I, Area of Potential Effect). Certain assumptions have been made, such as two meters (6.56 feet) of anticipated temporary construction easement beyond potential soundwall footing locations.

The Archaeological Survey Report (ASR) that was subsequently prepared documents the efforts to evaluate the potential for buried cultural deposits. This involved a sensitivity analysis for intact buried prehistoric and historic archaeological resources within the APE that relied on published maps, reports and databases. These included those generated by the U.S. Geological Survey (USGS), California Geological Survey (CGS), and the Natural Resources Conservation Service (NRCS). Additional information on previous archaeological survey findings and geological context was obtained through the Anthropological Studies Center and the Geography Department of Sonoma State University (SSU). The ASR also indicates that input regarding archaeological sensitivity was sought through consultation with local Native American tribes and individuals (see Chapter 6, Summary of Public and Agency Involvement and Tribal Coordination). The investigation also included a pedestrian field survey of all accessible portions (approximately 85 percent) of the archaeological APE.

Prehistoric Archaeological Resources: A records search at the Historical Resources Information System, Northwest Information Center (NWIC) indicates that no prehistoric archaeological sites are documented within the APE. However, seven recorded sites are located within 0.8 km [0.5 mile] from the archaeological APE. Also, three unsubstantiated ethnographic village locations may be situated within a mile radius from the project APE.

Based on a review of the geomorphological and archaeological records, there initially appeared to be a possibility that buried archaeological resources could be present within the project APE. Portions of the Santa Rosa Plain contain Holocene Age sediments deposited since the earliest known human use of the Sonoma County region. Various depositional processes (alluvial/colluvial sedimentation, stream channel migration, and seismic-induced ground movement) have buried stable land surfaces that could contain prehistoric archaeological deposits. Thus, there was a potential for buried prehistoric archaeological deposits in the valleys that are transected by the Highway 101 project and surroundings. Therefore, a thorough and systematic program of subsurface testing was conducted, which revealed little likelihood of encountering buried cultural materials within the project APE.

Historic Archaeological Resources: Reviews of project information, late-nineteenth century and twentieth-century maps, county and local histories, and cultural resource management reports were completed to determine the potential for encountering historical archaeological resources that might be eligible for the National Register of Historic Places. No known Hispanic or American period structures, features, or potential historical archaeological sites have been recorded or identified within or immediately adjacent to the archaeological APE, except for the Page family homeplace. The Page family homeplace consisted of a ranch house, a large hexagonal barn and additional outbuildings, all located at the east end of an east-west ridge with a view of the Cotati Valley and the Sonoma Mountains. Historical maps (Bower 1867; Thompson 1877) indicate that the homeplace stood either within or immediately adjacent to the archaeological APE. This site, however, was totally destroyed during the mid-1950s when the Highway 101 Cotati bypass was completed between Denman Flat and Helman Lane (DeClercq 1977:10). It is unlikely that any eligible historical resources remain; nevertheless, the archaeological APE at the general homeplace location was thoroughly field inspected for historic (and prehistoric) archaeological resources. No evidence of cultural resources was observed.

3.7.2.2 HISTORIC RESOURCES

Historic resources include districts, sites, buildings, structures, and objects included in or eligible for the National Register of Historic Places. To assess the impacts of the project on historic resources, both a Historic Property Survey Report (HPSR) and Historic Resource Evaluation Report (HRER) were completed for the project.

A HPSR was submitted to the State Historic Preservation Officer (SHPO) on September 12, 2005. The SHPO concurred in the negative eligibility findings on October 21, 2005. A copy of the SHPO's letter is provided in Appendix E, Agency Correspondence.

The Area of Potential Effects (APE) for the project architectural survey was developed consistent with Caltrans policies and general cultural resource practices to include the area directly affected by construction; it generally runs either with or one parcel beyond the proposed archaeological APE (see Appendix I, Area of Potential Effect). In some instances, where there are proposed soundwalls or raised structures such as overpasses, the architectural APE extends beyond the one parcel to account for potential visual effects. Where the proposed project bisects a parcel, the boundary is

generally drawn to include the whole parcel; however, where the architectural APE intersects large, vacant agricultural parcels where there is little potential for effects, the proposed architectural APE is generally aligned with the proposed or existing right of way. Where a viewshed is obscured by hillsides or vegetation, the proposed architectural APE is kept to the proposed or existing right-of-way. The APE includes locations for recommended soundwalls, permanent and temporary construction easements, new right-of-way acquisitions, and construction and staging areas. Recommended soundwalls are those that meet both the Caltrans feasibility criteria and preliminary determination for reasonableness (i.e. the Cost Allowance per Residence). Only those resources located within the architectural APE line were included in the survey. Any locations at soundwalls or temporary construction easements later identified and not included in the current APE will be reviewed as supplemental studies in accordance with the Section 106 Programmatic Agreement.

A reconnaissance survey was conducted in the field to account for all buildings, structures, and objects within the APE. This field reconnaissance helped to determine which buildings appeared to be more than 45 years of age and, therefore, would need more detailed study for this project. Background research included a review of the First Real Estate Solutions commercial database, historic and current USGS topographic maps, and resource-specific searches of archival and published records. Additional research was conducted at the California State Library; the Sonoma County Assessor's and Recorder's offices; the California Department of Transportation Library (Headquarters in Sacramento); Caltrans District 4 Maps and Plans Office (Oakland); Shields Library at University of California, Davis; Petaluma Museum Research Library; Solano County Library Annex in Santa Rosa; and the Healdsburg Museum and Historical Society.

A letter informing interested parties of this project was sent to area planning agencies, local governments, historical societies, and museums on June 25, 2003. No responses were received.

The architectural APE contains 115 buildings, groups of buildings, or structures, of which 14 required a formal evaluation on a DPR523 form. All of the survey resources formally evaluated are located within Sonoma County, in or near the cities of Petaluma, Cotati, Penngrove and Rohnert Park. The 14 survey resources were constructed in or before 1957 and were surveyed in the months of May and June 2003, and August 2004. Only one survey resource, the Trebino ranch located at 10 Helman Lane (Map Reference No. 14), was previously inventoried and evaluated in July 2000. Because that survey is less than five years old, specialists conducted a field verification of the site and completed an update to the previous evaluation. Access to one survey resource, 596 West Sierra Avenue, was not obtained for this study; however, it is evident from aerial photography and the county assessor records that this parcel contains at least two buildings.

The remaining buildings, groups of buildings, or structures fall under one of the six property types exempt from evaluation as outlined in Attachment 4 of the Programmatic Agreement between Caltrans, FHWA, ACHP, and the SHPO, which became effective January 1, 2004.

Residential Properties: Of the 14 residential properties within the architectural APE, more than half were constructed as part of small farm complexes on land subdivided in the 1890s through the 1920s. Nearly all of these resources were built in the 1920s and 1930s and demonstrate the typical development pattern common to many small agricultural regions in California. The majority of these properties had their beginnings as small, family-owned chicken farms. As the region developed, land was subdivided and only remnant buildings from this period are extant. Within the architectural APE, there are no extant buildings such as brooding houses, hatcheries, or colony houses that are directly associated with the region's poultry industry. The former agricultural properties within the APE ceased to function as farms in the second half of the twentieth century.

The remaining residential resources consist of a mixture of Minimal Traditional and small Ranch-style residences constructed in the 1940s and 1950s on semi-urban lots on the outskirts of Cotati. In general, the buildings on these residential properties are modified wood frame houses with simple plans. Only a few have escaped major alterations; most have been modified by the replacement of original windows, siding, or the construction of additions, all of which have compromised the historical integrity of the properties. Many of the farm complexes also have suffered a loss of feeling, association, and setting through the alteration of surrounding buildings, modern infill construction on nearby parcels, or the construction and widening of transportation features.

Transportation Features: The architectural APE also includes eight bridges and culverts constructed for Redwood Highway or Highway 101, and three bridges constructed by Sonoma County along adjacent county roads. All eleven bridges and culverts, constructed between 1918 and 1956, are listed as Category 5 structures (determined not eligible for listing in the National Register of Historic Places) in the California Historic Bridge Inventory completed by Caltrans in 1986 and they fall under one of the six property types exempt from evaluation as outlined in Attachment 4 of the Programmatic Agreement (PA) between Caltrans, FHWA, ACHP and the SHPO, which became effective January 1, 2004. Therefore, these structures were not formally evaluated for this project.

3.7.3 Environmental Consequences

3.7.3.1 Impacts on Archaeological Resources

An elevated level of effort, including a thorough and systematic subsurface testing program, has been conducted to evaluate the likelihood of encountering buried cultural resources during construction of the Highway 101 HOV Lane Widening Project. Based on the information collected during field surveys, documentary research, and subsurface testing, it is not anticipated that construction activities would encounter or disturb buried cultural resources. Measures are identified in Section 3.7.4, Avoidance, Minimization, and/or Mitigation Measures, to address late discovery of unanticipated buried cultural deposits.

3.7.3.2 IMPACTS ON HISTORIC ARCHAEOLOGICAL RESOURCES

As a result of the archival research and field reconnaissance, the project has little or no potential to affect historic archaeological resources. Therefore, no mitigation for such impacts is proposed.

3.7.3.3 IMPACTS ON ARCHITECTURAL RESOURCES

The properties within the architectural APE were evaluated in accordance with applicable sections of the NHPA and the implementing regulations of the ACHP as these pertain to federally funded undertakings and their impacts on historic properties. The properties also were evaluated in accordance with Section 15064.5(a) (2)-(3) of the CEQA Guidelines using the criteria outlined in Section 5024.1 of the California Public Resources Code. The 14 evaluated properties do not appear to meet criteria for listing in the NRHP or CRHR nor do they appear to be historical resources for the purposes of CEQA. Caltrans has determined that the only other properties present within the architectural APE, including state-owned resources, meet the criteria for Section 106 PA Attachment 4 (Properties Exempt from Evaluation); that is, Caltrans Professionally Qualified Staff (PQS) have determined that the properties within the architectural APE do not have demonstrable potential for historic significance. Therefore, there is no potential for impact to historic resources, and no mitigation is proposed.

As there are no eligible historic resources, there is no potential for impact to such resources and no mitigation is proposed.

3.7.4 Avoidance, Minimization and/or Mitigation Measures

3.7.4.1 PREHISTORIC ARCHAEOLOGICAL RESOURCES

In the unlikely event that previously unidentified buried cultural materials are unearthed during construction of the proposed project, Caltrans and FHWA would comply with 36 CFR §800.11 regarding late discoveries.

3.8 Hydrology and Floodplains

This section summarizes the regulatory setting, existing environment, potential impacts, and measures to prevent or reduce impacts to hydrologic resources and floodplains as a result of the proposed project. Documents reviewed in support of this study include the PSR/PDS, Highway 101 as-built plans, Caltrans strip topographic data, USGS quadrangles, Petaluma River Watershed Master Drainage Plan, Sonoma County design criteria, and the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies (FISs) for Sonoma County (FEMA, 1997), City of Rohnert Park (FEMA, 1980), and City of Petaluma (FEMA, 1989). Supplemental data were gathered during site investigations and meetings with Sonoma County Water Agency staff. The flood hydrograph data used for the hydraulic studies for this environmental document are based on the ultimate buildout according to the Sonoma County General Plan.

3.8.1 Regulatory Setting

The following federal, state, and local laws, ordinances, and guidelines provide the regulatory context for the project area:

National Flood Insurance Program (23 CFR §640, Subpart A, Section 650 et seq.) The National Environmental Policy Act (NEPA), 42 USC Section 4231, requires that all actions sponsored, funded, permitted, or approved by federal agencies undergo planning to ensure that environmental considerations are given due weight in project decision-making. Section 650.111 of the regulations calls for location hydraulic studies to be performed with detailed engineering design drawings to avoid and/or minimize hydrological and floodplain impacts. For work in floodplains that requires permit approval, environmental documentation must explain the impacts the project will have on these areas, and on the resources within those areas. Federal implementing regulations are at 23 CFR §771 (FHWA) and 40 CFR §1500-1508 (CEQ).

Executive Order 11988 (May 24, 1977) directs federal agencies to avoid to the extent possible adverse impacts associated with floodplains and to avoid direct or indirect support of incompatible development in floodplains.

3.8.2 Affected Environment

This section summarizes the surface water, groundwater, and floodplain studies that were carried out in support of this project.

3.8.2.1 HYDROLOGY

Hydrologic Resources: The primary hydrologic resources within the study area include Copeland Creek, Laguna de Santa Rosa, and Willow Brook. Copeland Creek and Laguna de Santa Rosa contribute run-off to the Russian River; drainage is generally in a northwesterly direction. These two watersheds range from alluvial to steeply mountainous, changing in elevation from approximately 29 m (95 ft) to 750 m (2,460 ft) mean sea level (msl). The Copeland Creek watershed is 1,270 ha (4.9 sq mi) in size, and the Laguna de Santa Rosa watershed is 984 ha (3.8 sq mi) in size. The Willow Brook watershed is 3,520 ha (13.6 sq mi) and contributes run-off to the Petaluma River. The watershed drains in a generally southwesterly direction. The Willow Brook watershed changes in elevation from approximately 12 m (40 ft) to 658 m (2,160 ft) msl.

Climate and Precipitation: The climatic characteristics in the vicinity of the project area are typical of basins protected from direct coastal winds by low hills. Precipitation generally occurs during a rainy season that extends from October to April. Summers are typically warm and dry, and winters are mild and wet. The average temperature for the area is approximately 14.4 degrees Celsius (58 degrees Fahrenheit). The average annual rainfall in the project area is approximately 64 centimeters (cm) (25.2 inches). The upper portions of the watersheds affected by the Highway 101 HOV Lane Widening Project receive up to 114 cm (45 inches) of rainfall annually (SCWA, 1983).

Roadside Drainage: Existing roadside drainage consists primarily of open grass-lined swales off the shoulders and within the unpaved highway median. In some locations the median is paved with a curb to convey roadside drainage to drop inlets and buried pipelines. In these instances, the buried pipelines are provided to convey run-off to receiving waters. Existing roadside drainage facilities were observed during site investigations and some deficiencies were found, as listed below:

- KP 16.7 to 18.8–On the west side of Highway 101 at the location of landslide mitigation performed in the late 1960s. At the toe of slope there exists a collector pipe that collects water from the hydro auger piping located on the bench above. Most of the "T"s have broken and there exists seepage along the toe.
- KP 16.7 to 16.84–On the east side of Highway 101, the V-ditch located at the top of slope is badly buckled and damaged, and surface water flows beneath it.
- KP 16.43–On the west side of Highway 101, severe erosion has occurred at the culvert outlet. Two pipe sections have fallen away, and near vertical exposures of fill/debris are exposed.

Cross-Drainage: Drainage is carried across and under Highway 101 at three stream crossings: Copeland Creek, Laguna de Santa Rosa, and Willow Brook. The current cross-drainage facilities have sufficient capacity to handle the design storm run-off flow rates. The 100-year flood elevations are contained in channels or culverts, as described below:

- Copeland Creek crosses Highway 101 approximately 590 meters (1,935 feet) south of the Rohnert Park Expressway overcrossing. Drainage from this watershed is conveyed under the highway in a twin 4.4-meter by 3-meter (14.5-foot by 10-foot) concrete box culvert.
- Laguna de Santa Rosa crosses Highway 101 approximately 640 meters (2,100 feet) north of Highway 116 (West). Drainage is conveyed under the highway by a 3-meter by 2.7-meter (10-foot by 9-foot) concrete box culvert.
- Willow Brook crosses the highway approximately 660 meters (2,165 feet) north of Old Redwood Highway in Petaluma. Drainage from this area is conveyed under the highway by twin bridges, approximately 21.3 meters (70 feet) long and 13 meters (42.5 feet) wide.

Erosion Prevention: All of the stream crossings potentially affected by the proposed project are protected by concrete linings or sack concrete that helps to alleviate the potential for bridge scour to occur at the abutments. In general, the channel sections upstream and downstream of the crossings are heavily vegetated or concrete-lined and appear stable. Although the Laguna de Santa Rosa channel is vegetated up and downstream of the affected reach of Highway 101, it is in a concrete-lined channel in the vicinity of the project.

3.8.2.2 FLOODPLAINS

FEMA Floodplain Designations: The Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRMs) prepared by FEMA for Sonoma County and for the cities of Rohnert Park and Petaluma

were reviewed to identify areas that would be inundated by a 100-year flood. A 100-year flood is a flooding event that has a probability of occurring once in 100 years. The FIRM maps indicate that Highway 101 is within the 100-year flood zone at the Laguna de Santa Rosa and Willow Brook crossings.

The FIRMs identify the following flood zone designations:

- Copeland Creek: Zone C—Areas of minimal flooding. Not in the 100-year flood zone (Zone A).
- Laguna de Santa Rosa: Zone A5—Areas of 100-year flood. Laguna de Santa Rosa crossing is in the 100-year flood zone (Zone A), but the 100-year flood elevations are contained in the channel.
- Willow Brook: Zone AE—Areas where the base flood elevation is determined. Base flood elevations through the Willow Brook crossing are heavily influenced by the flood elevations from the Petaluma River due to its proximity. The Highway 101 approaches to the Willow Brook structures are in Zone X, areas where the 100-year flood is expected to have an average depth of less than one foot.

Flooding Risks: Flooding of the Russian and Petaluma Rivers and their tributaries is mentioned in the FISs (FEMA 1997, 1980, and 1989). Review of project vicinity FISs and interviews with Sonoma County staff indicate that Willow Brook floods regularly into the trailer park adjacent to the south bank of the creek. Site investigations indicated attempts to construct a narrow levee on the south bank of Willow Brook with the aim of containing the creek within its banks. The levee, consisting of poorly compacted soil, extends only to Stony Point Road on the west, and floodwaters can overtop the road and still inundate the existing trailer park, effectively bypassing the levee.

3.8.3 Environmental Consequences

3.8.3.1 CROSS DRAINAGE IMPACTS

Drainages that cross Highway 101 were evaluated for potential impacts against the 100-year flood.

Copeland Creek and Laguna de Santa Rosa are contained in twin box culverts with open medians between twin bridge spans. Evaluation addressed whether closing the open medians at these structures would result in hydraulic impacts as a result of construction of crossings that are longer in the direction of flow. Copeland Creek and Laguna de Santa Rosa use continuous pier walls for each culvert crossing that would be retained and extended to become one continuous pier wall along each side of each widened highway crossing. Because the wall would be continuous and have a lower coefficient of friction than the natural ground between the structures, the flows would be improved and would be anticipated to pass smoothly and at slightly lower levels.

The twin Willow Brook bridges are separated by an open median. Analysis was performed to determine whether closing the open median at this structure and adding support piers would cause hydraulic impacts. It was determined that the crossing would be longer in the direction of flow and

the additional piers supporting the widened portion of the bridge would not have an adverse effect on the hydraulic conditions. Similar to the Copeland Creek and Laguna de Santa Rosa structures, one continuous long structure may actually improve flow conditions through the structure when compared to the two parallel structures separated by a rougher natural surface.

The proposed project would raise, grade, and pave the existing unpaved highway median. If the highway were widened using this approach through the floodplain areas in the vicinity of Willow Brook, the highway profile could be raised as much as 0.26 m (0.8 ft) and this would affect the ability of 100-year floodwater to sheet flow across the highway just north of the Old Redwood Highway-Petaluma Boulevard North Interchange; therefore, the existing highway profile is proposed to be maintained through all 100-year floodplain locations. Project modifications to avoid adverse cross drainage impacts at this location are discussed in Section 3.8.4.2; Avoidance, Minimization and/or Mitigation Measures; Cross Drainage. The existing guardrail in the median would be relocated or replaced in-kind in the median to avoid an adverse impact to flood waters crossing Highway 101.

3.8.3.2 FLOODPLAIN IMPACTS

Changes in Water Surface Elevations: Hydraulic analysis was performed for the Build Alternative to assess the potential for impacts to water surface elevations and flood risk for the 100-year flood (MACTEC, 2004). There is no measurable difference in water surface elevations between the existing structure and the addition of HOV and auxiliary lanes for Laguna de Santa Rosa, however, the addition of HOV lanes at the Copeland Creek crossing would produce a very slight increase in water surface elevation, 0.01 m (0.4 in.) during the 100-year flood. This increase is considered negligible as the very small increase is well within the accuracy of the hydrological and hydraulic modeling; it is, therefore, not considered an adverse impact. In addition, the slight increase is lost within the first 60 m (200 ft) upstream of the crossing. Water surface elevations for all three design storm run-off flow rates would remain within the channel, even with the slight increase, and no structures would be affected. Surface elevations within Willow Brook would not be affected by the Build Alternative. Because the flow rates analyzed are for build-out conditions per county standards, and because there would be negligible changes in water surface elevations for the bridges that would be modified as part of the Highway 101 Widening, no impact on the floodplain would result from the widening. Therefore, no mitigation is proposed.

Impacts on Natural and Beneficial Floodplain Values: The beneficial floodplain values at Copeland Creek, Laguna de Santa Rosa, and Willow Brook are natural moderation of floods, maintenance of water quality, fish and wildlife habitat, support of vegetative communities, open space and natural beauty, and groundwater recharge. The proposed project would not adversely affect these natural and beneficial floodplain values because it would cause negligible changes in water surface elevations. Therefore, no mitigation measures are proposed.

Support of Incompatible Floodplain Development: Floodplain encroachment has already occurred with construction of the original Highway 101. Since the proposed project would provide HOV lanes by widening the existing highway median, no additional floodplain encroachment is expected to

occur as a result of the project. Temporary channel obstructions can be expected to occur during construction, but all work in the channel would occur during the dry season (June 15th to October 15th) per California Department of Fish and Game 1602 Streambed Alteration Agreement requirements (see Section S-6, Agency Permits and Approvals).

The only new highway capacity to be provided by the proposed project is for high occupancy vehicles, carpools, and transit, and a climbing lane to improve operations associated with slow-moving vehicles on northbound Cotati Grade. Thus, the project would not be growth inducing (see Section 3.2.3, Growth) and would not support additional development in the floodplain.

3.8.3.3 OTHER HYDROLOGIC IMPACTS

There would be no other hydrologic impacts of the proposed project, which would not interrupt, divert, add to, or reduce hydrology in the project vicinity.

3.8.4 Avoidance, Minimization and/or Mitigation Measures

3.8.4.1 ROADSIDE DRAINAGE

The roadside drainage will be modified to accommodate the widened highway facility and the 100-year flood with the exception of allowing the floodwaters to continue to overtop the highway between Willow Brook and the Old Redwood Highway-Petaluma Boulevard Interchange. Culverts will be repaired or upgraded as necessary, including the previously mentioned deficiencies, and the new drainage facilities coordinated with the stormwater BMPs to provide a consistent and effective drainage system. The BMPs that will become an integral component of the drainage system will include open swales off of the outside shoulders that would be modified to accommodate the widened roadway run-off and detention basins.

3.8.4.2 CROSS-DRAINAGE

Because the culverts span only the width of the existing highway right-of-way, the culverts will need to be extended to accommodate the widening work. Also, in those instances where the traveled lanes traverse the stream crossing via bridge structures, these bridges will be widened within the currently open median, closing the median. Closing the median would not cause an adverse impact on bridge hydraulics at any crossing, therefore, no mitigation is proposed.

The effects of widening into the Highway 101 median will be mitigated to maintain the existing condition. The highway profile and current roadway elevations would be maintained from the Old Redwood Highway-Petaluma Boulevard North Interchange to a point at least 1400 m (4600 ft) north (actual location to be determined based upon detailed study during the design phase), and the guardrail barrier in the median would be relocated or replaced in-kind. These measures would allow the 100-year floodwaters to continue to overtop the highway in sheet flow towards the Petaluma River as they currently do under 100-year floods. Because this approach would not result in a changed condition, no additional mitigation is proposed.

3.9 Water Quality and Stormwater Run-off

This section summarizes the regulatory setting, existing environment, potential impacts, and avoidance and mitigation measures proposed to prevent or reduce impacts to water quality from stormwater run-off as a result of the proposed project.

3.9.1 Regulatory Setting

The following federal, state, and local laws, ordinances, and guidelines provide the regulatory context for the project area:

- **Federal Clean Water Act**: The federal Clean Water Act (CWA) is the primary water resources protection statute. Three sections of the CWA, in particular, are the focus of construction-phase compliance. Sections 401 (certification of state water quality standards), 402 (provisions of the National Pollutant Discharge Elimination System [NPDES]), and 404 (discharge of fill material into waters of the United States and wetlands) apply to the proposed project. Sections 401 and 404 (see 3.15, Biological Environment) are related and result in coordinated permitting by the state Regional Water Quality Control Board (RWQCB) and the U.S. Army Corps of Engineers (USACE), respectively, because of the CWA's authorization of state-adopted water quality standards.
- **Clean Water Act, Section 401** (Certification of Compliance with State Water Quality Standards): Under Section 401 of the CWA, the RWQCB makes a certification of compliance with state water quality standards for the project. Such certification may involve the imposition of project-specific waste discharge requirements (WDRs). The USACE will not issue a 404 permit without satisfaction of RWQCB Section 401 requirements.
- **Clean Water Act, Section 402** (NPDES Permits, California State Water Resources Control Board, National Pollutant Discharge Elimination System, Construction General Permit for Stormwater Discharges): The California State Water Resources Control Board (SWRCB) implements the National Pollutant Discharge Elimination System (NPDES) program, which was established by EPA to regulate discharges into receiving waters. One requirement of the NPDES program is to file a General Permit (Water Quality Order 99-08-DWQ) with the State to regulate the discharge of pollutants that arise from construction activities. An NPDES application requires the filing of a Notice of Intent (NOI) to comply with the Statewide General Permit (see next paragraph). Prior to the start of construction, a Storm Water Pollution Prevention Plan (SWPPP) must be prepared and submitted to the RWQCB. The SWPPP is normally prepared by the construction contractor. It identifies sources of pollutants that may be generated during construction activities and the measures that have been prescribed to reduce the potential for sediment and other pollutants from entering receiving waters.
- **California Department of Transportation** (National Pollutant Discharge Elimination System Permit for Storm Water Discharges): Caltrans requires and has its own NPDES permit (Order No. 99-06-DWQ) to regulate stormwater run-off. As described above, one requirement of the

NPDES program is to file a General Permit (Water Quality Order 99-08-DWQ) with the State to regulate the discharge of pollutants into receiving waters.

- **Municipal Separate Storm Sewer System (MS4) Permit**: Section 402 of the CWA also includes provisions relating to Municipal Separate Storm Sewer System (MS4) permits. In addition to the requirements of the NPDES Construction General Permit, above, construction-phase project impacts must be addressed within the framework of the MS4 permit by means of county-specific MS4 compliance programs that are approved by the RWQCB.
- **California Porter-Cologne Water Quality Control Act**: The California Porter-Cologne Water Quality Control Act of 1969 requires that each Regional Water Quality Control Board within the State formulate and adopt water quality control plans or basin plans for all areas in the region.

3.9.2 Affected Environment

The Highway 101 HOV Lane Widening Project is located mainly within the Water Quality Control Plan for the North Coast Region (Basin Plan) and jurisdiction of the North Coast Regional Water Quality Control Board. A small portion of the project (located at the south end) falls within the Basin Plan and jurisdiction of the San Francisco Bay Regional Water Quality Control Board. Regulations for discharges within the project area are included in the Basin Plan (December 1993) and the Water Quality Control Plan for the San Francisco Bay Basin (June 1995).

The north section of the project crosses two drainage courses, Copeland Creek and Laguna de Santa Rosa, which flow northwesterly toward the Russian River located approximately 20 km (12.5 mi) northwest of the project. The south section crosses one drainage course, Willow Brook, which flows southwesterly to the Petaluma River located approximately 0.3 km (1,000 ft) west of the project. Copeland Creek, Laguna de Santa Rosa, and Willow Brook are the direct receiving water bodies. Each of the watersheds includes an upper (eastern) portion located in relatively hilly terrain and a lower (western) portion located in alluvial valleys.

3.9.2.1 Beneficial Uses of Water Resources

The beneficial uses for the hydrologic areas as described within the two Basin Plans include groundwater (referring to groundwater of the Santa Rosa Valley), which is used for municipal, agricultural, and industrial supply; and surface water (referring to the Laguna de Santa Rosa), which is used for agricultural, industrial, recreational, and commercial uses, and cold freshwater habitat. No specific beneficial use has been listed for Willow Brook, though its confluence with the Petaluma River is immediately downstream of the freeway crossing. The Petaluma River has beneficial uses that include cold and warm freshwater habitat, navigation, migration of aquatic organisms, recreation, fish spawning, and wildlife habitat. Beneficial uses of the Petaluma Valley Groundwater Basin include municipal and agricultural.

3.9.2.2 EXISTING DRAINAGE

Existing pavement drainage flows to open grass-lined swales off the shoulders of Highway 101 and within the unpaved highway median. The proposed widening will include median paving and widening of the pavement along the shoulders. In this way, the swales currently located in the median will be removed and the drainage will be routed to the outside shoulders of the freeway.

3.9.2.3 WATER QUALITY

Currently, the only stream crossing the freeway within the project area that is listed as an impaired water body is Laguna de Santa Rosa, which is affected by sedimentation/siltation, nitrogen, and phosphorus. In the southern section of the project area, Willow Brook outlets into the Petaluma River immediately downstream of the freeway crossing. Here, the Petaluma River is listed as being affected by nutrients, pathogens and sedimentation.

3.9.2.4 POLLUTANTS

Pollutants found on streets and freeways that could be constituents of stormwater run-off include heavy metals, organic compounds (including petroleum hydrocarbons), sediments, trash, debris, oil, and grease.

3.9.3 Environmental Consequences

3.9.3.1 STORMWATER RUN-OFF

The project would result in a minor increase in impervious surface in the project area, approximately 20 hectares (50 acres), or 0.3 percent, of the combined 5,800 hectares (14,500 acres) of the Copeland Creek, Laguna de Santa Rosa and Willow Brook watersheds. This can be expected to translate into minor localized increases in urban run-off; however, the existing drainage system has adequate capacity to accommodate the small increase in run-off. Due to the lag time between the peak run-off from major tributaries in each of the watersheds, and that from the freeway run-off, the peak flow from the freeway will have substantially subsided by the time the watershed peak occurs. This, coupled with the minor increase in impervious surface, results in an insignificant increase in peak flow in each of the overall watersheds due to this project.

3.9.3.2 WATER QUALITY

As described previously, run-off from highways has been found to contain numerous pollutants, including metals, hydrocarbons, solids, oil, and grease. These constituents are most highly concentrated in the “first flush” of run-off that occurs from the first major rainstorm in a given period or season. After this first flush, the concentrations of highway pollutants are greatly reduced. Freeway drainage systems that provide adequate drainage facilities, are correctly designed, and incorporate permanent Best Management Practices (BMPs), to the maximum extent practicable, would be expected to improve the quality of freeway run-off that enters adjacent surface waters. Permanent BMPs would include erosion control measures and such structural treatments as detention

basins and biofiltration swales, as described below in Section 3.9.4 Avoidance, Minimization and/or Mitigation Measures. The relatively small increase in impervious surface would result in relatively minor amounts of increased run-off, and therefore, only a neglible additional amount of pollutants would be conveyed off of the roadway surface.

3.9.4 Avoidance, Minimization and/or Mitigation Measures

3.9.4.1 POLLUTANT REMOVAL AND REDUCTION

As described in the Caltrans Storm Water Management Plan (SWMP), BMPs are designed and implemented to reduce to the maximum extent practicable the discharge of pollutants from the storm drain system. Due to site constraints within the narrow Highway 101 project corridor, the drainage system must balance pollutant removal with economic factors related to maintenance, right-of-way, and construction costs. Treatment BMPs that would be implemented for the project include detention basins, biofiltration swales along the outside shoulders of the highway and flared-end sections and rock slope protection at drainage outlets. Preliminary evaluation indicates that there is adequate area to accommodate these BMPs within the existing and proposed right-of-way and that the BMPs can mitigate nearly 100 percent of all highway run-off, not just the increased run-off attributable to this project. These proposed BMPs are included in the estimated project construction costs. The proposed BMPs are from an approved list of BMPs known to be effective at reducing sediments and pollutants from highway run-off and would adequately remove the increased amount of pollutants attributable to this project while also removing a substantial amount of pollutants associated with the existing facility. These BMPs combined with the on-site drainage system would result in a significant reduction in trash, debris, absorbed hydrocarbons and metals, in the freeway run-off that enters streams and channels crossing the freeway. Other BMPs were investigated, but deemed inappropriate. Infiltration basins and infiltration trenches were deemed inappropriate due to the poor infiltration characteristics of the underlying soil and relatively high groundwater levels. Additionally, this project is located in a Municipal Separate Sewer System (MS4) and stenciling of drainage inlets would be required.

3.9.4.2 EROSION CONTROL MEASURES

Permanent erosion control measures also would be used to address site soil stabilization and reduce deposition of sediments in adjacent surface waters. Typical measures that would be applied include the application of soil stabilizers such as hydroseeding, netting, erosion control mats, rock slope protection, velocity dissipation devices, flared-end sections for culverts and others. Temporary erosion control measures would also be required for the construction phase of the proposed project and are discussed in Section 3.16.9, Water Quality and Stormwater Run-off.

3.10 Geology/Soils/Seismic/Paleontology/Topography

This section addresses geologic and seismic issues associated with project improvements as identified in the Project Study Report prepared by Caltrans (PSR, 2001). Conclusions are based on published and unpublished data, reports, and maps from federal, state, and county agencies; project files and as-built drawings of previous Caltrans projects in the area; published and online references from Sonoma County, the California Geologic Survey, the United States Geologic Survey; aerial photos and maps; and a geological reconnaissance of the project area.

3.10.1 Affected Environment

3.10.1.1 Regional Geology

The project area lies within the topographic divide between the Santa Rosa Plain on the north and Petaluma Valley to the south. Elevations range from 154 meters (505 feet) above sea level on Meacham Hill to less than 20 meters (66 feet) at the southern project limit and less than 30 meters (98 feet) at the northern project limit. The higher relief of Meacham Hill has resulted in more incised stream channels and steeper slopes in the area. The Highway 101 alignment was graded through Meacham Hill in the late 1950s and required deep cuts and moderately high fill embankments. Cuts and fills are reduced north of SR 116 and south of Pepper Road.

3.10.1.2 Soils and Sediments

Within the right-of-way, surface soils generally consist of porous and stiff sandy silts and clays, with lesser sands and silty sands. Based on road cuts and exposures along the central portion of the project corridor these soils are underlain at shallow depth by mudstones and sandstones of the Petaluma formation of Pliocene age. Andesite flows and pyroclastic rocks of the Sonoma Volcanics overlie the Petaluma formation at higher elevations and develop more resistant topographic landforms. North of the SR 116 interchange and south of the Pepper Road on-ramp, bedrock is not exposed. The soils in these lowland areas consist of an upper layer of expansive “adobe” clay soils over thick sequences of quaternary alluvium, older fan deposits, and colluvium.

3.10.1.3 Seismicity

The California Coast Range province is characterized by a high level of seismic activity related to the San Andreas system of faults. Faults within this system generally strike northwesterly and exhibit right-lateral, strike-slip displacement. These faults result from the northwesterly movement of the Pacific Plate against the North American Plate. Major active faults have broken the region into numerous fault-bound blocks (an active fault is defined as one that has had surface displacement within the last 11,000 years [Holocene-age]). Much of Sonoma County, including the project site, is located within a relatively intact block bound on the west by the active San Andreas fault and on the east by the active Healdsburg/Rodgers Creek fault system.

Faults within the San Andreas system that could induce strong ground shaking in the project vicinity include the north coast segment of the San Andreas fault (capable of Moment Magnitude [Mmax] 7.6), the Hayward fault (Mmax 6.9) and the Healdsburg/Rodgers Creek fault (Mmax 7.0). There is a 32 percent probability that an event magnitude greater than 6.7 will occur on the Healdsburg/Rodgers Creek fault within the next 30 years. An earthquake of Mmax 7.0 on the Healdsburg/Rodgers Creek fault would result in an estimated peak ground acceleration of .04, as indicated on Caltrans Hazard maps (Caltrans, 1996). Active faults in the proximity of the project are shown in Table 3.10-1.

Table 3.10-1: Major Bay Area Faults, Distance from Proposed Project Site and Maximum Earthquake Magnitudes at the Site

Fault Name	Distance in Kilometers (Miles) (Jennings, 1994)	Earthquake (Moment Magnitude)
San Andreas (North Coast Segment)	24.0 (14.9)	7.6
Hayward (North Segment)	45.0 (28.0)	6.9
Healdsburg/Rodgers Creek	8.0 (5.0)	7.0
West Napa	40.0 (24.8)	6.5

Source: CDMG, 1996 [California Division of Mines and Geology, 1996. Probabilistic Seismic Hazard Assessment for the State of California, DMG Open-File Report 96-08 and USGS Open File Report 96-706].

3.10.1.4 PALEONTOLOGY

The project area extends into consolidated bedrock units on Meacham Hill. These units consist of interbedded Miocene to Late Pliocene marine sandstone of the Wilson Grove Formation and non-marine conglomerate of the Petaluma Formation. Exposures of these units are pronounced in road cuts on the east and west sides of the highway. At one locality (designated USGS JA-1, USGS, 2004) indeterminate bivalve clasts were exposed in the Wilson Grove, but were of poor quality. Another locality (designated USGS M4511) contained 12 poorly-preserved mollusks (bivalves and gastropods) and crustacean fragments. Both of these exposures are poorly preserved, and represent Low Sensitivity resources. The Petaluma formation rarely contains significant fossils (USGS, 1983). Other areas of Meacham Hill contain pyroclastic deposits (tuff) of the Sonoma Volcanics that are devoid of any paleontological resources, and are, therefore, of Marginal Sensitivity.

Project areas in the lowlands north and south of Meacham Hill are overlain by Late Quaternary alluvial fans, alluvium and fill. West and south of Cotati, some surficial deposits have been termed "sand and gravel of Cotati." Vertebrate fossils have been collected from these deposits, however, these have not been studied (Lettis & Associates, 1998). Any fossils eroded from the bedrock units that have been transported to and deposited in the alluvial fans in the project area are likely to be very degraded and are not expected to have any paleontological significance.

3.10.2 Environmental Consequences

Geologic hazards that may affect the project include landsliding, expansive surficial soils, ground shaking, liquefaction-induced settlement, fault rupture, lateral spreading, and flooding. These geologic hazards are briefly described below.

3.10.2.1 LANDSLIDING

Because a majority of the highway corridor within the project limits is of high relief with somewhat unstable geologic conditions, landsliding presents a geologic hazard to the project. Of the landsides mapped during the field reconnaissance, the largest is the Denman Flat landside, which occurs on the east side of Highway 101 near Stony Point Road. A second landslide is located on the west side of the highway and was repaired in 1969. A third landslide, located on the east side, extends well above the highway and mostly occupies the slope outside the project right-of-way. Lesser soil slips and slumping, which have resulted in minor accumulations of debris on the benches or on the roadway shoulders, were also observed during field reconnaissance. Sliding can be anticipated to recur during the rainy season when surficial soil or weathered rock becomes saturated and loses shear strength.

3.10.2.2 EXPANSIVE SURFICIAL SOILS

The Santa Rosa Plain and Petaluma Valley contain expansive surface soils. These soils may extend down two meters (6.6 feet) or more. It is possible that some expansive soils remain following the initial grading of the four-lane freeway. Because expansive soil is subject to volume changes with seasonal changes in moisture content, certain structures or pavements could be damaged if placed directly on these expansive "adobe" soils.

3.10.2.3 GROUND SHAKING

A principal seismic hazard at the site is the potential for moderate to severe ground shaking from earthquakes occurring on one or more regional active faults. The San Andreas fault system has displayed considerable activity in the past and is considered likely to induce strong ground shaking within the project vicinity in the future, particularly along the Healdsburg/Rodgers Creek fault, the controlling fault in this system (see Section 3.10.1.3, Seismicity).

3.10.2.4 LIQUEFACTION-INDUCED SETTLEMENT

Liquefaction typically occurs in loose, cohesionless, saturated, granular soils below the groundwater table. Based on a review of available local soil borings, it appears that the flatter, low lying portions of the project area are underlain by potentially liquefiable soils, primarily north of the SR 116 interchange and south of Pepper Road. It is conceivable that some localized liquefaction may occur within the Meacham Hill area but, in general, these areas are underlain by dense and stiff soils and bedrock.

3.10.2.5 LATERAL SPREADING

Lateral spreading is a phenomenon associated with liquefaction where lateral movement of a soil embankment occurs along a free face. There is a possibility that this situation may occur at the Laguna de Santa Rosa creek channel.

3.10.2.6 FAULT RUPTURE

Historically, fault rupture accompanying severe earthquakes has generally occurred along preexisting fault traces. Because the closest active fault, the Healdsburg/Rodgers Creek fault, is eight kilometers (five miles) away, fault-related ground rupture is not likely to occur at the project site.

3.10.3 Avoidance, Minimization and/or Mitigation Measures

The following measures are proposed to avoid, minimize, and/or mitigate geologic and seismic impacts. To avoid, minimize, and/or mitigate seismic hazards in the proximity of the project, site specific investigations, seismic hazard engineering analysis, and engineering recommendations for retaining walls, landslide prevention, expansive soil treatment, cuts and fills, and bridge foundation elements would be conducted during final design using Guidelines for Geotechnical Foundation Investigations and Reports (Caltrans, 2002). Specifications for construction would conform to the Standard Specifications (Caltrans, 1999).

3.10.3.1 LANDSLIDING

Site specific engineering recommendations to minimize impacts due to landsliding would be defined based upon field testing and implemented during the final design phase and construction process. For slope stability, it is anticipated that cut and fill slopes would be constructed with inclinations of a vertical to horizontal ratio of 1:2 or flatter.

3.10.3.2 EXPANSIVE SURFICIAL SOILS

Treatment actions for potential settlement or shrink-swell potential of soils include the use of lime, cement, fly ash, compaction control measures, moisture control measures, and/or removal and replacement with non-expansive backfill. Implementation of these actions or a combination of these actions would be explored during the final design and construction process when site-specific subsurface investigations, borings, and field mapping would be performed.

3.10.3.3 GROUND SHAKING

The Maximum Credible Earthquake (MCE), defined as the largest earthquake reasonably likely to occur under presently known conditions, is used to determine the safety evaluation for freeway design. To minimize the potential damage from ground shaking, structures associated with this project must meet MCE standards, as established by the Caltrans Office of Earthquake Engineering. The MCE for this project is a magnitude 7.0 earthquake, on the controlling Healdsburg/Rodgers Creek fault. All project structures would be designed to this MCE in accordance with current Caltrans design standards.

3.10.3.4 LIQUEFACTION-INDUCED SETTLEMENT

To minimize potential liquefaction impacts associated with the proposed project, stone columns, sub-excavation, dynamic compaction, or de-watering methods would be implemented during construction. The most suitable method(s) would be selected based on site-specific subsurface investigations to identify the potential for liquefaction.

3.10.3.5 LATERAL SPREADING

Site specific engineering recommendations to minimize impacts from lateral spreading would be incorporated into the final design plans and construction contract documents.

3.10.3.6 FAULT RUPTURE

Site specific seismic hazard engineering analysis would be conducted during the final design phase and construction process to minimize the impacts of fault rupture.

3.11 Hazardous Waste/Materials

This section summarizes potential impacts from pre-existing hazardous wastes that could expose construction workers or the general public to health risks and that may require the implementation of special soil and/or groundwater management procedures. Section 3.16.10 discusses the potential impacts of hazardous materials that may be used or stored in conjunction with construction activities.

3.11.1 Affected Environment

Data sources used to identify previous and current land uses that could contribute to the contamination of the project area include the following:

- The Initial Site Assessment (ISA) for the Highway 101 from Old Redwood Highway to Rohnert Expressway Project Study Report (PSR) identified locations of known hazardous waste sites in the project vicinity. The ISA evaluation included searches of standard federal and state environmental "record sources" (e.g. the Federal Superfund list, a list of registered Underground Storage Tanks [USTs]). The search area was reported to begin 91 m (299 ft) north of the intersection of Highway 101 and Rohnert Park Expressway, and end 183 m (600 ft) south of the Highway 101 intersection with Old Redwood Highway, covering an area of 107 m (353 ft) on each side of the freeway center;
- The ISA for the Highway 101 Wilfred Avenue Interchange Project and the Site Investigation Report for the Highway 101 from Wilfred Avenue to Route 12 project, pertinent because of these projects' proximity to the current project corridor;
- Property specific reviews of properties that were identified in the Highway 101 from Old Redwood Highway to Rohnert Park Expressway project ISA as having the potential to impact the project area;
- Field or drive-by reconnaissance of the project area and vicinity; and
- Project files and as-built drawings of previous Caltrans projects in the area.

3.11.1.1 IDENTIFIED HAZARDOUS WASTE SITES

The ISA identified 22 hazardous waste sites within the search area and nine other incidences of potentially hazardous waste releases. Of these, six sites or incidences of releases were judged to have the potential to affect subsurface conditions along the corridor and, therefore, warranted additional assessment. A review of North Coast Regional Water Quality Control Board (RWQCB) and San Francisco RWQCB regulatory files was carried out for each the six properties identified as having any potential to affect the project. A summary of the file review identifying each site, its address, location within the project area, the type of hazardous material found, and its potential risk to the proposed project's scope and schedule, is presented in Table 3.11-1.

Caltrans' hazardous materials risk classifications are as follows:

- **High Risk**: Issues that could cause project costs to rise more than 20 percent for remediation, could cause long-term project schedule delays, or could require a large commitment of staff time to handle long-term responsibilities caused by acquisition and becoming a responsible party to a remediation.
- **Moderate Risk**: Issues that are somewhat routine and would require investigation, but would not be anticipated to affect the scope, schedule, or cost of the project.
- **Low Risk**: Issues that are related mainly to contractor-worker safety and disposal of materials generated during the construction phase of the project that would not affect the scope, schedule, or cost of the project.

The Caltrans PSR identified two additional areas of concern based on a review of historical aerial photographs. The first area was the property at the proposed southbound Highway 101 on-ramp at Old Redwood Highway. The second was the proposed path for the northbound Highway 101 on-ramp from Highway 116. However, review of the City of Petaluma assessor records indicates that with the exception of aerially-deposited lead, described in Section 3.11.1.3, it is unlikely that hazardous wastes from historical property uses in these areas have the potential to affect the project.

Table 3.11-1: Hazardous Waste Sites/Incidences With Potential to Affect Subsurface Conditions along the Highway 101 HOV Lane Widening Project Corridor

Identified Property	Property Address	Property Location	Hazardous Material	Risk Assessment
Exxon Facility	5153 Old Redwood Highway, Petaluma	Approximately 400 meters (1,300 feet) northeast of project corridor (Station 16+00).	Release from a gasoline UST (underground storage tank); some impacted soil; groundwater investigation ongoing.	Low Risk
Cotati Maintenance Yard	9161 Water Road, Cotati	Approximately 300 meters (980 feet) east of the corridor (Station 78+40).	Release from a gasoline UST; no information on the initial extent of the release or whether remediation has been completed.	Low Risk
Sabek Tanker Spill	Highway 101 Median	In the proposed widening corridor (KP 21.6/PM 13.5) (Station 104+00)	Release from a gasoline tanker truck in April 1991; clean-up activities have been completed and case closure received, but residual concentrations of gasoline compounds could remain	Medium Risk
Former Shell Facility	4675 Old Redwood Highway, Cotati	Adjacent east of the corridor (Station 95+50); upgradient of the proposed ROW expansion	Release from a gasoline UST; groundwater pumping and treatment and soil vapor extraction completed in the mid-1990s.	Low Risk
Royal Coach Car Wash	7360 Commerce Boulevard, Cotati	East of the corridor (Station 99+90).	Release from a gasoline UST; remediation completed in 2000.	Low Risk
Texaco Facility	6301 Commerce Boulevard, Rohnert Park	East of the corridor (Station 114+20)	Release from a gasoline UST; groundwater extraction currently being performed.	Low Risk

Source: MACTEC Engineering and Consulting, 2004.

3.11.1.2 LEAD-BASED PAINT AND ASBESTOS

The proposed Build Alternative includes upgrading several undercrossings and overpasses. Due to the age of these structures, hazardous wastes consisting of lead-based paint and asbestos may be present in the building materials. Lead-based paint (LBP) and asbestos in good condition do not

present an immediate health risk; however, lead particles and asbestos fibers could be emitted to the air during demolition or renovation activities.

Lead-Based Paint

Lead oxide and lead chromate commonly were used in paints until 1978, when regulations limited the allowable lead content in paint; therefore, exterior painted surfaces of the bridge crossings have the potential to contain LBP. Lead is a suspect carcinogen, a known teratogen (i.e., it has the potential to cause birth defects), and a reproductive toxin.

Asbestos-Containing Materials

Asbestos, a known human carcinogen, was commonly used in construction materials until the 1980s, when it was phased out. Therefore, utility lines, bridge expansion joints, concrete-asbestos water lines, and other bridge building materials have the potential to contain asbestos.

3.11.1.3 AERIALLY-DEPOSITED LEAD

Various studies have been performed in the Bay Area that have identified aerially-deposited lead (ADL) in soils near roadways, attributed to the use of lead in gasoline, a practice that was phased out beginning in the mid-1970s. Typically, ADL exists in the top 0.15 m (six in) of soil in unpaved shoulder and median areas of many freeway corridors.

In addition, any yellow traffic paint, yellow thermoplastic paint/tape, or markings placed prior to 1990 contain lead chromate as the pigment, which, when removed, might generate airborne heavy metal debris that exceeds the threshold established by Title 22 California Code of Regulations.

3.11.2 Environmental Consequences

Reconnaissance and investigation of the project corridor identified various hazardous waste issues associated with the proposed project, described below.

3.11.2.1 HAZARDOUS WASTE RELEASES

No properties immediately adjacent to the project corridor were identified that exhibited obvious signs of hazardous wastes or waste releases. However, three facilities (Exxon, 5153 Old Redwood Highway, Petaluma; Royal Coach Car Wash, 7360 Commerce Boulevard, Cotati; and Former Shell, 4675 Old Redwood Highway, Cotati) immediately adjacent to the project corridor appear to have groundwater plumes that likely have migrated below the project corridor. At this time, it does not appear that the Build Alternative will require excavation to groundwater in these areas. If future changes to the project alternatives make excavation to groundwater in these areas necessary, additional investigation must be carried out.

3.11.2.2 LEAD-BASED PAINT AND ASBESTOS

Field reconnaissance in the project area identified several bridges and overcrossings with the potential to contain LBP and/or asbestos, including the Railroad Avenue Undercrossing (Caltrans Bridge Nos. 20-166L and 20-166R) and the Laguna de Santa Rosa Bridge (Caltrans Bridge Nos. 20-16L and 20-16R).

3.11.2.3 AERIALLY DEPOSITED LEAD

Based on a review of the Site Investigation Report performed for the Wilfred Avenue to Route 12 project, selected because site conditions for this portion of Highway 101 are expected to be similar to those of the present project, it is anticipated that soil with elevated lead concentrations will be encountered during the project improvement activities. In addition, the presence of yellow traffic stripes and pavement markings in the project area creates a potential for the release of airborne contaminants during construction and renovation, which poses a possible health risk to construction workers and residents.

3.11.3 Avoidance, Minimization and/or Mitigation Measures

Protective measures to reduce or eliminate hazardous wastes-related impacts are described below.

3.11.3.1 HAZARDOUS WASTE RELEASES

The following general avoidance and prevention measures are proposed based on information identified to date:

- The construction contractor(s) will be required to prepare and implement a Worker Health and Safety Plan (to be approved by Caltrans and the California Department of Toxic Substances Control [DTSC] prior to onset of construction activities).
- The construction contractor(s) will be required to prepare a Stormwater Pollution Prevention Plan (SWPPP) to be approved by Caltrans prior to the onset of construction activities.
- Any contaminated groundwater that is encountered during construction will be handled in accordance with the water quality provisions outlined in Section 3.9 of this document.
- In the event that a previously undocumented hazardous waste site or underground storage tank is uncovered during construction of the proposed project, Caltrans will consult with the appropriate federal and state regulatory agencies to determine what action, if any, is appropriate.
- Contract special provisions will be written and construction plans prepared so that any contaminated soil excavated during construction will be handled and disposed of in accordance with applicable federal and state laws, regulations, rules, and policies.

3.11.3.2 LEAD-BASED PAINT AND ASBESTOS

Sampling activities in locations where lead-based paint or asbestos-containing materials are anticipated (including the Railroad and West Sierra Avenue Undercrossings, Highway 101/116 Separation, and Laguna De Santa Rosa Bridge) will be conducted to identify whether potential hazards exist and whether special precautions are necessary during bridge/overcrossing renovation

and or/demolition. During the course of demolition or renovation activities, construction contractors and/or Caltrans will follow regulations requiring the abatement of lead-based paint and asbestos-containing materials to prevent exposure to nearby residents and workers.

Prior to any demolition work or upgrading or reconstruction of existing overpasses, on- or off-ramps, an asbestos-containing materials (ACM) survey would be conducted for these structures. In addition, any other structure (e.g. retaining or sound walls) requiring demolition would be tested for ACM prior to demolition. The ACM survey would be performed by an inspector who is Asbestos Hazardous Emergency Response Act (AHERA)-certified under Toxic Substances Control Act (TSCA) Title II and California Occupational Safety and Health Administration (Cal OSHA)-certified under Section 1529 of the California Code of Regulations. Prior to demolition, a notification along with the results of the ACM survey would be submitted to the Bay Area Air Quality Management District as part of the permitting process.

3.11.3.3 AERIALLY-DEPOSITED LEAD

Sampling activities in locations where elevated lead concentrations are anticipated or petroleum hydrocarbon-contaminated soil and groundwater could be encountered will be conducted to identify whether potential hazards exist and whether special handling of soil is required. Short-term impacts of soil excavation will be mitigated through implementation of Best Management Practices (BMPs), which may include preparation of a soils management plan (SMP) or section of the Worker Health and Safety Plan to prevent exposure of workers to potentially hazardous excavated soils and to comply with applicable waste handling and disposal regulations if offsite disposal of soil/rock is necessary. If ADL or petroleum hydrocarbon-contaminated soil is present, a variance for re-use of soil can be obtained through the DTSC if contamination meets the extractable and total lead/petroleum hydrocarbon thresholds. The RWQCB will also need be notified and provisions for the re-use and storage of ADL and petroleum hydrocarbon contaminated soil will need to be addressed in the SWPPP prepared by the contractor for the project.

It is recommended that surface samples of soil be collected and analyzed for total lead. Any sample exceeding 1,000 milligrams/kilogram (mg/kg) should be tested for Toxicity Characteristic Leaching Procedure (TCLP). Any soil containing 5 milligrams per liter (mg/l) or more of lead is considered a RCRA hazardous waste for disposal purposes. If Caltrans were to use the affected soils on site, special provisions subject to the ADL variance provided to Caltrans by the DTSC should be used. This variance includes testing of the soils exceeding the hazardous waste thresholds via a WET-DI procedure, a waste extraction procedure using de-ionized water as a leaching agent. If the SCTA were to be responsible for construction of the proposed project, it would consult with DTSC and the San Francisco RWQCB regarding the applicability of the variance and management of lead-impacted soil. A detailed work plan and a sampling and testing program would be prepared in accordance with Caltrans guidelines during the design phase of the project.

3.12 Air Quality

This section reports the results of the *Air Quality Impact Technical Report* (Terry A. Hayes Associates 2005) prepared for the project.

3.12.1 Regulatory Setting

Air quality in the United States is governed by the federal Clean Air Act (CAA). In addition to being subject to the requirements of CAA, air quality in California is also governed by more stringent regulations under the California Clean Air Act (CCAA). At the federal level, the CAA is administered by the United States Environmental Protection Agency (USEPA). In California, the CCAA is administered by the California Air Resources Board (CARB) at the state level and by the Air Quality Management Districts at the regional and local levels. The proposed project is located within the Bay Area Air Quality Management District (BAAQMD).

USEPA is responsible for establishing the National Ambient Air Quality Standards (NAAQS), which are required under the 1977 CAA and subsequent amendments. USEPA regulates emission sources that are under the exclusive authority of the federal government and establishes various emission standards, including those for vehicles sold in states other than California. Automobiles sold in California must meet the stricter emission standards established by CARB.

CARB, which became part of the California Environmental Protection Agency (CalEPA) in 1991, is responsible for meeting the state requirements of the federal CAA, administering the CCAA, and establishing the California Ambient Air Quality Standards (CAAQS). The CCAA requires all air districts in the state to endeavor to achieve and maintain the CAAQS, which are generally more stringent than the corresponding federal standards.

The BAAQMD is primarily responsible for assuring that the national and state ambient air quality standards are attained in the San Francisco Bay Area. The BAAQMD has jurisdiction over an approximately 5,600-square-mile area, commonly referred to as the Bay Area Air Basin (BAAB). The District's boundary encompasses most of the nine Bay Area counties: Alameda County, Contra Costa County, Marin County, San Francisco County, San Mateo County, Santa Clara County, Napa County, southwestern Solano County and southern Sonoma County. The discussion of project air quality setting and effects refers primarily to conditions within the BAAB, which from both the federal and state regulatory perspectives is considered one geographic entity.

3.12.1.1 National and State Ambient Air Quality Standards

State and federal standards for major air pollutants are summarized in Table 3.12-1. Primary standards were established to protect the public health. Secondary standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials,

vegetation and other aspects of the general welfare. Since the CAAQS are more stringent than the NAAQS, the CAAQS are used as the standard in the air quality analysis for the Highway 101 HOV Lane Widening Project.

Table 3.12-1: State and National Ambient Air Quality Standards

Pollutant	Averaging Period	California		Federal	
		Standards	Attainment Status	Standards	Attainment Status
Ozone (O_3)	1 hour	0.09 ppm (180 µg/m^3)	Non-attainment	0.12 ppm (235 µg/m^3)	Non-attainment
	8 hour	--	--	0.08 ppm (157 µg/m^3)	Non-attainment
Respirable Particulate Matter (PM_{10})	24 hour	50 µg/m^3	Non-attainment	150 µg/m^3	Attainment
	Annual Arithmetic Mean	20 µg/m^3	Non-attainment	50 µg/m^3	Attainment
Fine Particulate Matter ($PM_{2.5}$) [1]	24 hour	--	--	65 µg/m^3	Attainment
	Annual Arithmetic Mean	12 µg/m^3	Non-attainment	15 µg/m^3	Attainment
Carbon Monoxide (CO)	8 hour	9.0 ppm (10 mg/m^3)	Attainment	9.0 ppm (10 mg/m^3)	Attainment
	1 hour	20 ppm (23 mg/m^3)	Attainment	35 ppm (40 mg/m^3)	Attainment
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	--	--	0.053 ppm (100 µg/m^3)	Attainment
	1 hour	0.25 ppm (470 µg/m^3)	Attainment	--	--
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	--	--	0.03 ppm (80 µg/m^3)	Attainment
	24 hour	0.04 ppm (105 µg/m^3)	Attainment	0.14 ppm (365 µg/m^3)	Attainment
	1 hour	0.25 ppm (655 µg/m^3)	Attainment	--	--

[1] The Federal air quality standard for $PM_{2.5}$ was adopted in 1997. Presently, no methodologies for determining impacts relating to $PM_{2.5}$ have been developed or adopted by federal, state, or regional agencies. Additionally, no strategies or mitigation programs for $PM_{2.5}$ have been developed or adopted by Federal, State, or regional agencies.

Source: California Air Resources Board and United States Environmental Protection Agency, January 2003.

Attainment Status

Under CAA and CCAA requirements, areas are designated as either attainment or non-attainment for each criterion pollutant based on whether the NAAQS or CAAQS have been achieved. Areas are designated as non-attainment for a pollutant if air quality data show that a state or federal standard for the pollutant was violated at least once during the previous three calendar years. Exceedences that are affected by highly irregular or infrequent events are not considered violations of a state standard and are not used as a basis for designating areas as non-attainment. Under the CCAA, the Sonoma County portion of the BAAB is designated as a non-attainment area for O_3, PM_{10}, and $PM_{2.5}$. Under the CAA, the Sonoma County portion of the BAAB is designated as a non-attainment area for O_3

Carbon Monoxide (CO)

Carbon monoxide (CO), a colorless and odorless gas, interferes with the transfer of oxygen to the brain. It can cause dizziness and fatigue and can impair central nervous system functions. CO is emitted almost exclusively from the incomplete combustion of fossil fuels. Automobile exhausts

release most of the CO in urban areas. CO dissipates relatively quickly, so ambient carbon monoxide concentrations generally follow the spatial and temporal distributions of vehicular traffic. CO concentrations are influenced by local meteorological conditions, primarily wind speed, topography, and atmospheric stability. The BAAB is in attainment for CO at both the federal and state levels.

Ozone (O_3)

Ozone ($O_{3)}$, a colorless toxic gas, is the chief component of urban smog. O_3 enters the blood stream and interferes with the transfer of oxygen, depriving sensitive tissues in the heart and brain of oxygen. O_3 also damages vegetation by inhibiting growth. O_3 forms in the atmosphere through a chemical reaction between reactive organic gases (ROG) and nitrogen oxides (NO_X) under sunlight. Motor vehicles are the major sources of ROG and NO_X. O_3 is present in relatively high concentrations within the Bay Area air basin. Under the CAA and the CCAA, the Sonoma County portion of the BAAB is designated as a non-attainment area for O_3.

Nitrogen Dioxide (NO_2)

Nitrogen dioxide (NO_2), a brownish gas, irritates the lungs. It can cause breathing difficulties at high concentrations. Like O_3, NO_2 is not directly emitted, but is formed through a reaction between nitric oxide (NO) and atmospheric oxygen. NO and NO_2 are collectively referred to as NOx and are major contributors to ozone formation. NO_2 also contributes to the formation of PM_{10} (see discussion of PM_{10} below). The BAAB is in attainment for NO_2.

Sulfur Dioxide (SO_2)

Sulfur dioxide (SO_2) is a product of high-sulfur fuel combustion. The main sources of SO_2 are coal and oil used in power stations, in industries, and for domestic heating. Industrial chemical manufacturing is another source of SO_2. SO_2 is an irritant gas that attacks the throat and lungs. SO_2 concentrations have been reduced to levels well below the state and national standards, but further reductions in emissions are needed to attain compliance with standards for sulfates and PM_{10}, of which SO_2 is a contributor. The BAAB is in attainment for SO_2 at both the federal and state levels.

Suspended Particulate Matter (PM_{10} and $PM_{2.5}$)

Particulate matter consists of very small liquid and solid particles floating in the air, which can include smoke, soot, dust, salts, acids, and metals. Respirable particulate matter (PM_{10}) refers to particulate matter less than 10 microns in diameter, about one/seventh the thickness of a human hair. Fine particulate matter ($PM_{2.5}$) refers to particulate matter that is 2.5 microns or less in diameter, roughly 1/28th the diameter of a human hair. PM_{10} and $PM_{2.5}$ pose a greater health risk than larger-size particles. When inhaled, these tiny particles can penetrate the human respiratory system's natural defenses and damage the respiratory tract. Major sources of PM_{10} include motor vehicles; wood burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires and brush/waste burning, industrial sources, windblown dust from open lands; and atmospheric chemical and photochemical reactions. $PM_{2.5}$ results from fuel combustion (from motor vehicles, power generation, industrial facilities), residential fireplaces, and wood stoves. In addition, $PM_{2.5}$ can be

formed in the atmosphere from gases such as SO_2, NO_X, and volatile organic compounds. The Sonoma County portion of the BAAB is a non-attainment area for PM_{10} and $PM_{2.5}$ under the CCAA.

Lead

Prior to 1978, mobile emissions were the primary source of lead in air. Between 1978 and 1987, the phase-out of leaded gasoline reduced the overall inventory of airborne lead by nearly 95 percent. Currently, industrial sources are the primary source of airborne lead. Since the proposed project does not contain an industrial component, lead emissions were not analyzed in the air quality assessment. The potential for aerially deposited lead to be in soils along Highway 101 is discussed in Section 3.11, Hazardous Waste/Materials.

3.12.1.2 AIR QUALITY PLANS

The BAAQMD, in coordination with the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG), is responsible for preparing air quality plans pursuant to the CAA and CCAA. Under the CAA, State Implementation Plans (SIPs) are required for areas that are designated as non-attainment for O_3, CO, NO_X, SO_X, or PM_{10}. For the BAAB, a SIP is required for O_3 since the region is currently designated as a Federal Non-attainment Area for O_3. The most current SIP is called the Bay Area 2001 Ozone Attainment Plan, which was adopted by the MTC, ABAG, and BAAQMD in October 2001. CARB adopted this Plan in November 2001, and EPA approved the associated emissions budget in February 2002.

Whereas the SIP is prepared pursuant to the CAA, the Bay Area Clean Air Plan (CAP) is prepared to meet the requirements of the CCAA. The CAP is the region's plan for reducing ground-level ozone. The CAP identifies how the BAAB would meet the state O_3 standard by its attainment date. The 2000 CAP focuses on identifying and implementing control measures that would reduce O_3. It was adopted by the BAAQMD in December 2000.

3.12.1.3 AIR QUALITY CONFORMITY

Under the 1990 CAA Amendments, the U.S. Department of Transportation cannot fund, authorize, or approve federal actions to support programs or projects that are not first found to conform to CAA requirements. Transportation conformity is a way to ensure that federal funding and approval goes to those transportation activities that are consistent with air quality goals. A conformity determination demonstrates that total emissions projected for a plan or program are within the emissions limits ("budgets") established by the air quality plan or SIP and that transportation control measures (TCMs) are implemented in a timely fashion. Conformity applies to transportation plans, transportation improvement programs (TIPs), and projects funded or approved by the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA) in non-attainment or maintenance areas. Section 176 of the CAA specifies that no federal agency may approve, support, or fund an activity that does not conform to the applicable implementation plan. FHWA and FTA jointly make conformity determinations within air quality non-attainment and maintenance areas to ensure that federal actions conform to the "purpose" of SIPs. In late 1993, USEPA promulgated final

rules for determining conformity of transportation plans, programs, and projects. These final rules, contained in 40 CFR Part 93, govern the conformity assessment for the proposed project.

3.12.2 Affected Environment

3.12.2.1 CLIMATE

The Bay Area is characterized by cool, dry summers and mild, wet winters. Temperature in the project area and its vicinity averages approximately 59 degrees Fahrenheit annually, with an average maximum summer temperature of approximately 88 degrees Fahrenheit and an average minimum winter temperature of approximately 38 degrees Fahrenheit. The Eastern Pacific High, which is a strong persistent anticyclone, is the major influence on the climate in the area. The area experiences little precipitation during the summer months, when a high-pressure cell prevents storms from affecting the California coast. During the winter, the high-pressure cell weakens and shifts southward. Storms occur more frequently and winds are usually moderate. Total precipitation in the project area averages approximately 29.5 inches annually.

Low wind speeds and temperature inversions contribute to the buildup of air pollution. Low wind speed contributes to the buildup of air pollution because it allows more pollutants to accumulate in the air within a period of time. The highest air pollutant concentrations in the Bay Area generally occur during inversions, when temperature increases as altitude increases, thereby preventing air close to the ground from mixing with the air above it. As a result, air pollutants are trapped near the ground.

3.12.2.2 AIR MONITORING DATA

The BAAQMD monitors air quality conditions at various locations throughout the Bay Area Air Basin. The closest air-monitoring station to the project area is the Santa Rosa–5th Street monitoring station, which is approximately 6.4 miles north of the project area. Historical data from the Santa Rosa–5th Street monitoring station were used to characterize existing conditions within the vicinity of the proposed project area and to establish a baseline for estimating future conditions with and without the proposed project.

Criteria pollutants monitored at the station include O_3, CO, NO_2, $PM_{2.5}$, and PM_{10}. SO_2 is not monitored at this monitoring station or at any of the other monitoring stations in Sonoma County. A summary of the data recorded at the monitoring station during the 2001-2003 period is shown in Table 3.12-2, Criteria Pollutant Violations: Santa Rosa–5th Street Monitoring Station. The CAAQS and NAAQS for the criteria pollutants are also shown in the table. As Table 3.12-2 indicates, criteria pollutants CO and NO_2 did not exceed the CAAQS or NAAQS between the years 2001 and 2003. O_3 exceeded the state one-hour standard once during the 2001-2003 period. $PM_{2.5}$ exceeded the federal 24-hour standard once during the period, and PM_{10} exceeded the state 24-hour standard on five days during the period.

Table 3.12-2: 2001-2003 Criteria Pollutant Violations: Santa Rosa – 5th Street Monitoring Station

Pollutant	Standard Exceedence	2001	2002	2003
Ozone (1 hour)	Maximum 1-hr concentration (ppm)	0.086	0.077	0.096
	Days > 0.12 ppm (Federal 1-hr standard)	0	0	0
	Days > 0.09 ppm (State 1-hr standard)	0	0	1
Ozone (8 hour)	Maximum 8-hr concentration (ppm)	0.063	0.060	0.079
	Days > 0.08 ppm (Federal 8-hr standard)	0	0	0
Carbon Monoxide	Maximum 8-hr concentration (ppm)	2.40	2.10	1.77
	Days > 9 ppm (Federal 8-hr. standard)	0	0	0
	Days > 9.0 ppm (State 8-hr standard)	0	0	0
Nitrogen Dioxide	Maximum 1-hr concentration (ppm)	0.057	0.054	0.055
	Days > 0.25 ppm (State 1-hr standard)	0	0	0
$PM_{2.5}$	Maximum 24-hr concentration (µg/m^3)	75.9	50.7	38.8
	Days > 65 µg/m^3 (Federal 24-hr standard)	1	0	0
PM_{10}	Maximum 24-hr concentration (µg/m^3)	78.1	63.6	36.3
	Estimated days > 150 µg/m^3 (Federal 24-hr standard)	0	0	0
	Estimated days > 50 µg/m^3 (State 24-hr standard)	3	2	0

Source: California Air Resources Board

3.12.2.3 BACKGROUND CARBON MONOXIDE (CO) CONDITIONS

CO concentrations are typically used as an indicator of conformity because CO levels are directly related to vehicular traffic volumes, the main source of air pollutants. A review of data from the Santa Rosa–5th Street monitoring station for the 2001-2003 period indicates that the average eight-hour background CO concentration is approximately 2.3 ppm. Assuming a typical persistence factor of 0.6, the estimated one-hour background concentration is approximately 3.9 ppm. The existing eight-hour background concentration does not exceed the state and federal eight-hour CO standard of 9.0 ppm. Additionally, the existing one-hour background concentration does not exceed the state and federal one-hour CO standards of 20.0 ppm and 35.0 ppm, respectively.

3.12.2.4 SENSITIVE RECEPTORS

The following categories of people, as identified by the CARB, are considered most sensitive to air pollution: children under 14, the elderly over 65, athletes, and people with cardiovascular and chronic respiratory diseases. Locations that may contain a high concentration of these sensitive population groups are called sensitive receptors and include residential areas, hospitals, daycare facilities, elder care facilities, elementary schools, and parks. Four representative sensitive receptors have been identified within a quarter-mile of Highway 101 within the project limits:

- Training Wheels Preschool (65 West Cotati Avenue, Cotati)
- Cotati-Rohnert Park Co-Op Nursery (150 West Sierra Avenue, Cotati)
- Mt. Taylor Children's Center, (190 Arlen Drive, Rohnert Park)
- Quest Montessori Elementary School (21 William Street, Cotati)

In addition to the sensitive receptors listed above, residential uses are also located within a quarter-mile of the highway within the project limits.

3.12.3 Environmental Consequences

3.12.3.1 METHODOLOGY

CARB's EMFAC2002 emissions factor model and Caltrans' CALINE4 dispersion model were used to determine air quality impacts. Caltrans' Transportation Project-Level Carbon Monoxide Protocol was used to determine CO impacts. A quantitative analysis was conducted for this project because the traffic report identified certain roadway segments within the project area would have future level-of-service (LOS) E or F under the Build Alternative. These roadway segments were analyzed to determine whether the project would result in any CO violations. Emissions and concentrations related to lead were not analyzed because the proposed project does not contain lead emissions sources. A qualitative PM_{10} hot-spot analysis was conducted in accordance with 40 CFR 93.123 (b)(4), because the USEPA has not released modeling guidance on how to perform quantitative PM_{10} hot-spot analysis.

The proposed project would have an adverse impact if:

- Daily operational emissions were to exceed the BAAQMD operational emissions thresholds for CO, ROG, NO_X, or PM_{10} as shown in Table 3.12-3.
- Operational emissions were to exceed federal emissions thresholds for ROG or NO_X, as shown in Table 3.12-4.
- Project-related traffic were to cause CO concentrations at roadway segments to violate the CAAQS or NAAQS for either the one- or eight-hour period as shown in Table 3.12-1.

Table 3.12-3: BAAQMD Daily Operational Emissions Thresholds

Criteria Pollutant	Pounds per Day
Carbon Monoxide (CO)	550
Reactive Organic Gas (ROG)	80
Nitrogen Oxides (NO_X)	80
Particulates (PM_{10})	80

Source: Bay Area Air Quality Management District.

Table 3.12-4: Federal Emissions Threshold for Nonattainment Areas

Pollutant	Pounds per Day [1]	Tons per Year
ROG	270	50
NO_X	550	100

[1] Federal thresholds are expressed in tons per year. For ease of comparison, Federal thresholds have been converted to pounds per day.

Source: United States Code of Federal Regulations, Title 40, Part 93.

3.12.3.2 IMPACT ANALYSIS

No-Build Alternative

The No-Build Alternative assumes no major construction on Highway 101 through the project limits other than normal maintenance, rehabilitation and repair. The roadway improvements and maintenance are not anticipated to generate any new vehicle trips and, thus, would not affect the region's vehicle miles of travel (VMT). Since regional VMT is not anticipated to increase, changes in vehicle emissions are not anticipated. No substantial increase is expected in CO concentrations at sensitive receptor locations. PM_{10} concentrations are not anticipated to increase. No impact is anticipated.

Build Alternative

The proposed project would not generate any additional VMT, and thus, would not change vehicle emissions. Therefore, no substantial impacts associated with operational emissions are anticipated for the Build Alternative.

To provide a worst-case simulation of CO concentrations within the area, CO concentrations were calculated for 26 roadway segments, including those segments predicted to have LOS E or F in 2030. At each roadway segment, traffic-related CO contributions were added to background CO conditions for the year 2010, which represents the opening year of the project and the year 2030, when traffic volumes in the project area are expected to stabilize. The reduction in roadway congestion and associated reduction in the time vehicles would spend idling or moving slowly would result in lower CO concentrations. The proposed project would not cause CO concentrations to exceed state or federal standards, and therefore, no substantial impact related to CO concentrations would occur under the Build Alternative.

Road dust is the primary source of operational PM_{10} emissions for the proposed project. The project would not generate new vehicle trips. Additionally, the project is anticipated to improve the flow of vehicles and reduce congestion at nearby roadways. PM_{10} concentrations are not anticipated to increase, and no impact is anticipated.

3.12.4 Avoidance, Minimization and/or Mitigation Measures

No adverse impacts are anticipated, and therefore, no minimization or mitigation measures are recommended.

3.12.5 Transportation Conformity Analysis

The FHWA cannot approve funding for project activities beyond preliminary engineering unless the project is in conformity with USEPA transportation conformity regulations (40 CFR Part 93). The criteria that the Build Alternative must satisfy are discussed below. The federal conformity criteria are applicable only to operations emissions. They do not apply to construction emissions.

§93.110 The conformity determination must be based on the latest planning assumptions.

ABAG and MTC are the Metropolitan Planning Organizations responsible for determining areawide population and employment forecasts, modeling regional travel demand, and formulating the Regional Transportation Plan (RTP) and the Transportation Improvement Program (TIP). Assumptions used in the transportation and traffic analysis for this project, upon which the microscale CO and regional criteria pollutant analyses are based, are derived from ABAG's most recently adopted population, employment, travel, and congestion estimates. Traffic forecasts for the proposed project were developed using the Sonoma County travel demand.

§93.111 The conformity determination must be based on the latest emission estimation model available.

Emission estimates are based on the CARB EMFAC 2002 model. Caltrans CALINE4 model was used for CO modeling. The EMFAC2002 and CALINE4 models are the most recent models approved by USEPA.

§93.112 The conformity determination must be made according to the consultation procedures of this rule and in the applicable implementation plan, and according to the public involvement procedures established in compliance with 23 CFR Part 450. The conformity determination must be made according to §93.105(a)(2) and (e) and the requirements of 23 CFR Part 450.

The proposed project would follow the consultation procedures in 20 CFR Part 450, 40 CFR Part 51, and 40 CFR Part 93 (§93.105(a)(2) and (e)) before making its conformity determination. The environmental document for the proposed project would be available for public review and comment prior to adoption.

§93.114 There must be a currently conforming transportation plan and TIP at the time of project approval.

The most recent RTP in the project area is the *Transportation 2030 Plan*. The most recent TIP is the 2005 TIP. The *Transportation 2030 Plan* was adopted by MTC in February 2005. The 2005 TIP was adopted by MTC on July 28, 2004. FHWA made its conformity determination for the *Transportation 2030 Plan* on March 17, 2005 and the 2005 TIP in October 4, 2004. The proposed project is included in the *Transportation 2030 Plan* and the 2005 TIP.

§93.115 The proposed project must come from a conforming transportation plan and TIP.

The proposed project is included in the financially constrained portion of the Transportation 2030 Plan and 2005 TIP.

§93.116 The proposed project would not cause or contribute to any new localized CO or PM_{10} violations or increase the frequency or severity of any existing CO or PM_{10} violations in CO and PM_{10} non-attainment and maintenance areas.

Operations of the Build Alternative would not increase daily trips within the Highway 101 project limits or vehicle miles traveled in the region. The anticipated reduction in congestion on Highway 101 would improve traffic flow, incrementally reducing CO levels to below No Build levels at some roadway segments within the Highway 101 project limits. No CO or PM_{10} violations would result from operations of the proposed project. The proposed project would not violate state or federal standards.

§93.117 The proposed project must comply with PM_{10} control measures that are contained in the applicable implementation plan.

PM_{10} control measures are not available for the San Francisco Bay Area since the BAAQMD does not have an implementation plan for PM_{10}. The No Build and Build Alternatives would not change VMT in the region. However, the proposed project would improve roadway conditions, which would result in lower PM_{10} concentrations. If a federal PM_{10} attainment plan were required in the future, Caltrans would identify appropriate control measures for PM_{10} emissions.

Based on the above, the proposed project satisfies USEPA's project-level conformity requirements (40 CFR Part 93).

3.13 Noise

3.13.1 Regulatory Setting

The FHWA and Caltrans guidelines establish methods and criteria for evaluating and mitigating highway traffic noise effects in compliance with the National Environmental Policy Act (NEPA). These noise analysis methods and abatement criteria are also in compliance with the requirements stemming from the California Environmental Quality Act (CEQA).

State and Federal Guidelines for Noise Impact Evaluation

The noise impact evaluation criteria for the proposed project are in agreement with the Noise Abatement Criteria (NAC) established by the FHWA in *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (23 CFR Part 772, 2004) and criteria adopted by Caltrans in *Traffic Noise Analysis Protocol for New Highway Construction and Highway Reconstruction Projects* (Protocol) (Caltrans, 1998a). For residential land uses, parks, schools, and hospitals, the FHWA outdoor noise criterion is 67 dBA, and the interior noise criterion is 52 dBA. Table 13.3-1, Activity Categories and Noise Abatement Criteria, shows noise criteria for these and other land use categories.

According to the Protocol, traffic noise impacts occur when one or both of the following occurs: 1) the project results in a substantial noise increase; 2) predicted noise levels approach or exceed the NAC. A traffic noise impact will also occur when the predicted noise levels of the project approach within 1 dBA or exceed the Noise Abatement Criteria shown in Table 13.3-1. Noise abatement measures are considered for this project when predicted future peak hour traffic noise levels are equal to or exceed 66 dBA.

Table 3.13-1: Activity Categories and Noise Abatement Criteria

Activity Category	NAC, Hourly A-Weighted Noise Level, dBA Leq(h)	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: 23 CFR Part 772, 2004

The Caltrans Protocol states that if it is predicted that there would be traffic noise impacts, all reasonable and feasible noise abatement measures must be identified and implemented. The abatement must provide a minimum of 5 dBA of noise reduction to be considered feasible. Additional feasibility criteria include topography, access requirements (for driveways, ramps, etc.), the presence of local cross streets, other noise sources in the area, and safety considerations.

Greater noise reductions are encouraged as long as they can be achieved under the reasonableness guidelines. The overall reasonableness of noise abatement is determined by considering a multitude of factors including but not necessarily limited to the following:

A. Cost of the abatement
B. Absolute noise levels
C. Change in noise levels
D. Noise abatement benefits
E. Date of development along the highway
F. Life cycle of abatement measures[1]
G. Environmental impacts of abatement construction
H. Views (opinions) of affected residents
I. Input from the public and local agencies
J. Social, economic, environmental, legal, and technological factors

[1] It is normally not considered reasonable to construct a wall where planned future use would limit its useful life to less than 15 years.

The cost of the abatement for residential areas is compared to a calculated Reasonable Allowance per Residence. Noise abatement that exceeds the cost allowance is not considered reasonable. Normally, noise abatement is not designed for the second-floor level. However, noise abatement designed to provide a 5-dBA noise reduction for the second-floor level without exceeding the modified allowance is considered within the scope of reasonableness. (Caltrans 1998a)

The Protocol identifies four scenarios under which noise impacts or abatement considerations for a project may need to be re-analyzed. These scenarios, quoted from Section 1.4.3 of the Protocol, are as follows:

a) There has been a significant change in project design concept and /or scope from that of the most recent environmental analysis, or
b) A significant period of time has passed since the most recent environmental analysis, generally considered to be three years between project milestones, e.g. Record of Decision to Right-of-Way Certification, or
c) An undeveloped land becomes planned, designed and programmed, after the analysis, but before the date of public knowledge, or
d) An undeveloped land becomes developed after the date of public knowledge (disclosure of impacts, if any, but abatement not considered).

Noise Barriers and Noise Reflection

The construction of noise barriers (soundwalls) sometimes generates concern that single or parallel sound barrier configurations will provide surfaces that "bounce" noise, and thus increase noise levels for some receivers. Studies show that single barrier configurations (barriers on one side of the highway only) reflect noise toward the opposite side of the highway. The noise increase on the opposite side, however, is typically 1 to 2.4 dBA, which is barely perceptible to the human ear. Performance of parallel noise barriers (barriers running along opposite sides of the highway) can decrease slightly because of noise reflections between the two barriers. Performance degrades less than 3 dbA when the ratio of the distance between opposite barriers to the height of the barriers is greater than ten to one. Because the distance to height ratio of barriers proposed for the Highway 101 HOV Lane Widening Project is greater than ten to one, the performance degradation of the parallel barriers would not be perceivable by the human ear. No adverse noise effects would result from the construction of these walls.

3.13.2 Affected Environment

3.13.2.1 NOISE FUNDAMENTALS

Noise is unexpected or undesired sound. Most noise in the project area is traffic related. Noise is transmitted by pressure waves through the atmosphere (sound waves) and is defined by these characteristics:

- ***Frequency*** refers to the length of a single sound wave, or how many sound waves pass one point in one second (cycles per second). Frequency determines the pitch of the sound – from low to high. The unit for frequency is Hertz (Hz). The human ear can detect sound in the range of 16 (low) to 20,000 (high) Hertz.
- ***Amplitude*** is the height of the sound wave and determines the intensity of sound. A high amplitude sound wave sounds louder than a sound wave of the same frequency at low amplitude. The units are decibels (dB) and are described logarithmically. Therefore, a doubling of wave height does not result in a doubling of decibels; instead, a doubling of sound energy results in a 3-dB increase in sound.

The average healthy ear can barely perceive noise level changes of 3 dB or less. A change of 5 dB is readily perceptible, and a change of 10 dB is perceived as being twice or half as loud. As discussed previously, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy would result in a barely perceptible change in sound level.

Humans perceive the same amplitude as louder at some frequencies than at others. In measuring sound, to account for the frequency response of the human ear, adjustments are applied at differing frequencies to reflect the average individual's sensitivity to sound. For noise associated with traffic and similar human activity, these adjustments are referred to as A-scale weighting. Noise levels are reported in terms of A-weighted decibels, or dBA. Figure 3.13-1 shows typical A-weighted noise levels.

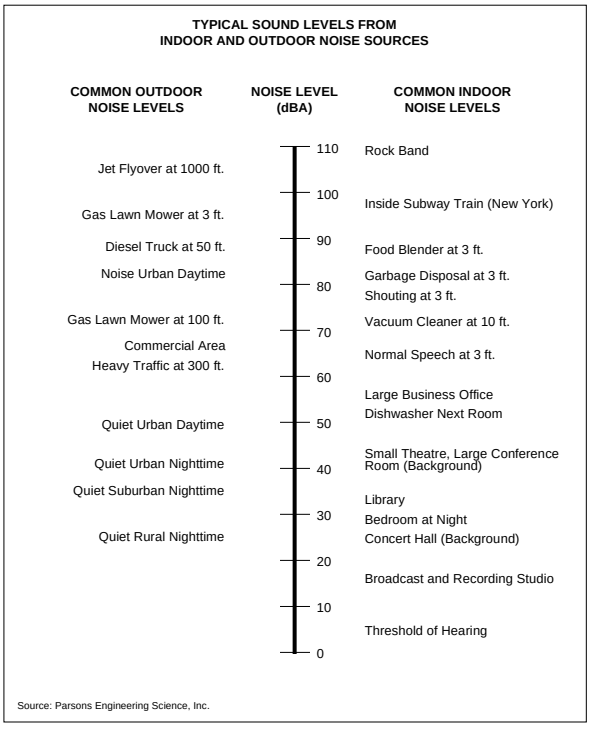


Figure 3.13-1: Typical A-Weighted Noise Levels

Noise levels in our daily environment fluctuate over time. Various terms have been developed to describe time-varying noise levels. The following is a list of the noise descriptors most commonly used in Caltrans/FHWA traffic noise analysis:

- ***Equivalent Sound Level (Leq)*** represents an average of the sound energy occurring over a specified period. Leq is, in effect, the steady-state sound level that, in a given period, would contain the same acoustical energy as the time-varying sound that actually occurs during the same period. The Noise Abatement Criteria (NAC) used by Caltrans and FHWA use an Leq that averages A-weighted sound over a one-hour period of time. This Leq is referred to as Leq(h).
- ***Maximum Sound Level (Lmax)*** is the highest instantaneous sound level measured during a specified period.
- ***Insertion Loss (I.L.)*** is the actual noise level reduction at a specific receiver due to construction of a noise barrier between the noise source (traffic) and the receiver. Generally, it is the net effect of the soundwall attenuation and the loss due to ground effects.

As sound travels over a distance, it changes in both level and frequency content. The manner in which noise reduces with distance depends on the following factors:

Geometric spreading−The movement of the vehicles on a highway makes the source of the sound appear to emanate from a line rather than a stationary point. From a line source, the sound level attenuates (drops off) by 3 dB per doubling of distance from the source.

Ground absorption–Most often, the noise path between the highway and the observer is very close to the ground. When this ground path is reflective like a parking lot or a smooth body of water, no ground attenuation is assumed. If, however, the path is acoustically absorptive (like soft dirt, grass, or scattered bushes and trees), it is assumed that the sound drops off an additional 1.5 dB per doubling of distance.

Atmospheric effects−Atmospheric conditions, such as wind or air temperature, can have a substantial effect on noise levels when noise receptors are located more than 60 meters (200 feet) from a highway.

3.13.2.2 EXISTING HIGHWAY 101 NOISE LEVELS

Noise measurements were conducted in the project vicinity from April 19 through April 26, 2004. During that time, sensitive land use areas and the location and height of existing property walls were identified. All noise measurements were conducted in accordance with the FHWA guidelines outlined in *Measuring of Highway Related Noise* (FHWA-DP-96-046).

Existing noise levels in the project corridor were measured at 18 locations representing sensitive land uses, such as homes, businesses, and motels. Short-term measurements were made at 11 of these locations, while long-term measurements were conducted at seven locations. The dominant noise source at all measurement sites was traffic on Highway 101. Local street traffic contributed at some of the measurement sites, but was substantially less than the highway traffic noise. Short-term measurements were 20 minutes each in duration. Long-term measurements were for a minimum of

24 hours, during which the noise level data were stored at 20-minute intervals. The interval data were stored in the instrument's internal memory, which allowed the highest traffic noise hour to be identified during data analysis and graphical examination of the results.

Short-term measurements were adjusted to the peak-hour traffic noise level by comparison with the highest noise level of a nearby long-term measurement. In addition, a calibration "K" factor was applied where modeled results were substantially higher than measured results (Caltrans 1998). A "K" factor of -1.9 was applied at receptor location R87 to adjust for modeled versus measured traffic noise levels. A "K" factor -3.8 was applied to R90 to R95, due to an existing brick wall and earthen berm combination that was not easily modeled. The adjusted short-term peak hour traffic noise levels range between 61 and 74 dBA and are summarized in Table 3.13-2, Short-Term Noise Measurement Results. A summary of the long-term noise monitoring results is shown in Table 3.13-3, Long-Term Noise Measurement Results.

The monitoring results indicate that the existing traffic noise levels already approach or exceed the NAC at many locations along the project alignment. According to the long-term monitoring results, the peak noise hours occur during the morning commute at locations along both sides of Highway 101. Noise levels are lower during the evening commute hours. Monitoring locations are shown on Figure A (Sheets 1 through 15) in Appendix A.

Table 3.13-2: Short-Term Noise Measurements Results

Site No.	Street Address, City	Land Use[1]	Noise Abatement Category (Criterion)[2]	Meter Location	Measurement Dates	Start Time	Measured Leq, dBA[3]	Adjusted Peak-Hour Leq, dBA[4]	Adjusted Using Long-Term Site
ST1	5100 Montero Way, Petaluma	HM	B (67)	Near Bldg.	4/20/04	9:25 AM	65.8	68	LT1
ST1A	5135 Montero Way, Petaluma	HM	B (67)	Near Bldg.	4/20/04	9:25 AM	75.5	78	LT1
ST2	606 Stony Point Road, Petaluma	SFR	B (67)	Rear Yard	4/19/04	4:28 PM	70.6	74	LT1
ST3	1425 Stony Point Road, Petaluma	SFR	B (67)	Front Yard	4/20/04	2:17 PM	68.0	70	LT2
ST4	1109 Debbie Hill Road, Cotati	SFR	B (67)	Front Yard	4/20/04	4:48 PM	63.8	67	LT3
ST5	1187 Debbie Hill Road, Cotati	SFR	B (67)	Rear Yard	4/22/04	12:33 PM	58.9	61	LT3
ST6	539 West Sierra Avenue, Cotati	MFR	B (67)	Rear Yard	4/21/04	4:15 PM	67.0	70	LT4
ST7	441 W. School Street, Cotati	SFR	B (67)	Rear Yard	4/22/04	9:58 AM	67.5	69	LT5
ST8[5]	7309 Old Redwood Highway, Rohnert Park	SFR	B (67)	Rear Yard	4/23/04	9:54 AM	67.2	68	LT7
ST9	6800 Commerce Boulevard, Rohnert Park	MFR	B (67)	Front Yard	4/23/04	9:14 AM	68.0	69	LT7
ST10	6500 Redwood Drive #126, Rohnert Park	HM	B (67)	Near Bldg.	4/23/04	8:35 AM	72.0	73	LT7

Notes:
1 – SFR = Single-Family Residential; MFR = Multi-Family Residential; HM = Hotel/Motel.
2 – According to Caltrans Traffic Noise Analysis Protocol.
3 – All short-term measured noise levels are a 20-minute Leq.
4 – Measurements conducted during off-peak hours were adjusted to the peak-hour Leq based on a comparison with long-term noise levels measured near short-term measurement sites and are listed in the last column.
5 – This property will be demolished as a result of the improvements project.

Source: Parsons, 2005.

Table 3.13-3: Long-Term Noise Measurements Results

Site No.	Street Address, City	Land Use[1]	Noise Abatement Category (Criterion)[2]	Meter Location	Measurement Dates	Start Time	Duration, No. of Hours	Measured Peak Hour Leq, dBA[3]	Peak-Hour Time
LT1	300 Stony Point Road, #227, Petaluma	MH	B (67)	Rear Yard	4/19 – 4/21	3:30 PM	45	75	5AM, 6AM
LT2	207-209 Orchard Lane, Petaluma	MFR	B (67)	Rear Yard	4/20 – 4/21	12:00 PM	28	68	7AM
LT3	900 Birch Lane, Cotati	SFR	B (67)	Side Yard	4/20 – 4/22	4:05 PM	46	69	7AM
LT4	8877 Benedetti Court, Cotati	SFR	B (67)	Side Yard	4/21 – 4/26	12:40 PM	120	67	7AM
LT5	417 Christensen Circle, Cotati	SFR	B (67)	Rear Yard	4/21 – 4/22	2:00 PM	25	73	7AM, 8AM
LT6	278 Braden Court, Cotati	SFR	B (67)	Rear Yard	4/21 – 4/23	6:00 PM	41	68	6AM, 7AM, 8AM
LT7	67 Alma Avenue, Rohnert Park	SFR	B (67)	Rear Yard	4/22 – 4/26	5:00 PM	90	64	7AM

Notes:
1 – SFR = Single-Family Residential; MFR = Multi-Family Residential, MH = Mobile Home Park.
2 – According to Caltrans Traffic Noise Analysis Protocol.
3 – The highest measured hourly noise level recorded during the long-term measurement period.
Source: Parsons, 2005

3.13.3 Environmental Consequences

Noise impacts are assessed by comparing the future (year 2030) Build Alternative condition with the existing condition. The greatest noise generation from a roadway is when volumes are high and speeds are still close to free flow; this "worst case" condition is referred to as Level of Service C (LOS C) by traffic engineers. To approximate the worst case LOS C scenario for the Year 2030 Build condition, the noise analysis assumed freeway volumes of 1,800 vehicles per lane per hour traveling at approximately 105 km/h (65 mph). The volumes used for the HOV lanes were 1,500 vehicles per lane per hour at a speed of 105 km/h (65 mph). The truck climbing lane volume used in the analysis was 175 vehicles per lane per hour at a speed of 56 km/h (35 mph). The projected traffic volumes for the year 2030 were used for ramps, but capped at 1,000 vehicles per lane per hour to maintain the greatest noise generation potential. The speeds used for ramp traffic were 56 km/h (35 mph) for straight ramps and 32 km/h (20 mph) for loop ramps.

The Caltrans highway noise prediction computer model, SOUND 2000, PC Version 3.2, was used for the noise computations. This model is based on the highway traffic noise prediction method specified in FHWA-RD-77-108 (FHWA, 1978). Table 3.13-4, Predicted Future Noise and Barrier Analysis summarizes the results of the predicted levels at the representative receptor locations. The levels summarized in Table 3.13-14 include Option A for the Highway 101 / SR 116 Interchange with a combination soundwall S91/S95 at that interchange. Variations at the Highway 101 / SR 116 Interchange are shown in the following tables:

- Table 3.13-5, Predicted Future Noise and Barrier Analysis Without Soundwall S95, shows predicted noise levels at the Highway 101 / SR 116 interchange, under Option A, without the combination soundwall S91/S95.
- Table 3.13-6, Predicted Future Noise and Barrier Analysis for SR 116 Interchange Option B, shows predicted noise levels at the Highway 101 / SR 116 Interchange, with the combination soundwall S91/S95.
- Table 3.13-7, Predicted Future Noise and Barrier Analysis for SR 116 Interchange Option B Without Soundwall S95, shows predicted noise levels at the Highway 101 / SR 116 interchange, under Option B without the combination soundwall.

As shown in the tables, the difference between the predicted No-Build and Build traffic noise levels would be negligible (2 dBA or less) at the representative receptors. These noise differences between No-Build and Build conditions would be primarily due to the presence of High Occupancy Vehicle (HOV) lanes in the Build case. The predicted Build Alternative peak hour Leq(h) at the representative receptors ranges from 62 to 78 dBA, exceeding the NAC at most locations. Noise abatement measures considered are described in Section 3.13.4, Avoidance, Minimization and/or Mitigation Measures.

3.13.4 Avoidance, Minimization and/or Mitigation Measures

Tables 3.13-4 through 3.14-7, Predicted Future Noise and Barrier Analysis, list predicted noise levels without barriers (soundwalls) and with barriers of various heights. Recommended barrier heights and locations are shown on Figure A (Sheets 1 through 15) in Appendix A. All barrier heights and locations are based on preliminary engineering. The tables and descriptions in this section include some locations where soundwalls are not feasible and others where soundwalls would not meet the Caltrans criteria for calculated Reasonable Allowance per Residence. The plan drawings in Figure A in Appendix A show only soundwalls that are considered both feasible and reasonable. A final decision concerning noise barriers will be made upon completion of the project design and public involvement processes.

Locations Where Soundwalls Would Meet Feasible and Reasonable Criteria

Soundwall S19 would be on the southbound side of Highway 101 from the Petaluma Boulevard north off-ramp to just past Willow Brook. This wall would reduce highway traffic noise at 51 mobile homes in the Leisure Lake Village mobile home park (represented by receptors R1 to R8).

Soundwall S80 would be on the northbound side of Highway 101. The wall starts at just after station 78+20 and ends near the entrance of the Highway 101 off-ramp to West Sierra Avenue. The wall would reduce highway traffic noise at nine single-family residences (represented by receptors R55 to R59).

Soundwall S84 would be on the northbound side of Highway 101 at the shoulder where the highway is on fill. The wall would also span the West Sierra Avenue overpass bridge. The wall would reduce highway traffic noise at four single-family residences and 16 affected first floor units in four multi-family buildings (represented by receptors R62 to R64).

Soundwall S90 would on the northbound side of Highway 101 from just after West Sierra Avenue to just past East Cotati Avenue. The wall would reduce highway traffic noise at 13 single-family residences, one church, and two multi-family buildings having nine affected first floor units (represented by receptors R65 to R73).

Soundwall S91 (SR 116 Interchange Option A) would be along the southbound side of Highway 101 between Richardson Lane and Highway 116. The soundwall would be along the shoulder of the highway and would end at the southbound Highway 101 on-ramp from Highway 116. The wall would provide protection for 24 single-family residences (represented by receptors R75 to R83) from highway traffic noise.

Table 3.13-4: Predicted Future Noise and Barrier Analysis**

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1,3] Leq(h), dBA	PREDICTED PEAK HOUR NOISE LEVELS														BARRIER NO./LOCATION
			No Build WITHOUT BARRIER Leq(h), dBA	Build WITHOUT BARRIER Leq(h), dBA	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( ) Leq(h), dBA	IMPACT TYPE (A/E[4] or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)	
								Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
R1	MH	73 E	75	75	2	B (67)	A/E	73	2	72	3	70 T	5	**69** R,5	6	67	8	
R2 S	MH	69 E	71	72	3	B (67)	A/E	70	2	70	2	68 T	4	**67** R	5	66	6	
R3 C	MH	75 E	77	78	3	B (67)	A/E	74	4	72	6	70 T	8	**68** R	10	67	11	
R3A S	MH	70 E	72	72	2	B (67)	A/E	70	2	69	3	67 T	5	**66** R,5	6	65	7	
R4 6	MH	75 M-LT1	77	76	1	B (67)	A/E	73	3	71	5	69 T	7	**67** R	9	66	10	S19/ Shoulder
R4A S	MH	70 E	72	72	2	B (67)	A/E	70	2	69	3	67 T	5	**66** R,5	6	65	7	
R5	MH	75 E	77	77	2	B (67)	A/E	73	4	71	6	69 T	8	**67** R	10	66	11	
R6	MH	75 E	77	76	1	B (67)	A/E	73	3	71	5	69 T	7	**68** R,5	8	66	10	
R7 S	MH	70 E	72	72	2	B (67)	A/E	70	2	68	4	67	5	**66** R,T	6	65	7	
R8	MH	66 E	68	69	3	B (67)	A/E	67	2	66	3	65	4	**64** R,T	5	63	6	
R12	SFH	73 E	74	75	2	B (67)	A/E	71	4	70	5	68 T	7	**67** R,5	8	66	9	
R12A	SFH	67 E	68	69	2	B (67)	A/E	67	2	66	3	65 T	4	**64** R	5	63	6	Shoulder[8]
R13 C,6	SFH	74 M-ST2	77	77	3	B (67)	A/E	73	4	71	6	69 T	8	**67** R	10	66	11	
R14	SFH	73 E	74	75	2	B (67)	A/E	72	3	71	4	69 T	6	**67** R	8	66	9	
R18	SFH	70 M-ST3	71	72	2	B (67)	A/E	72	0	72	0	72	0	72	0	72	0	No Barrier
R19	SFH	70 E	71	72	2	B (67)	A/E	72	0	72	0	72	0	72	0	72	0	
R9	MOT	68 M-ST1	71	72	4	B (67)	A/E	70	2	69	3	68	4	68	4	68	4	No Barrier
R10 C	MOT	78 E	77	78	0	B (67)	A/E	75	3	73	5	**71** R,T	7	70	8	68	10	ROW[8]
R11	MOT	78 M-ST1A	77	78	0	B (67)	A/E	75	3	73	5	71 T	7	**69** R	9	68	10	
R15	SFH	65 E	67	67	2	B (67)	A/E	67	0	66	1	65	2	65 T	2	64	3	
R16	SFH	68 E	69	70	2	B (67)	A/E	69	1	68	2	67	3	66 T	4	**65** R	5	ROW[8]
R17 C	SFH	68 M-LT2	73	74	6	B (67)	A/E	71	3	70 T	4	68	6	67	7	**66** R,5	8	

Notes:
1 - Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM – hotel/motel.
3 - M - Measured noise level; E - Estimated noise level.
4 - A/E = Approach or Exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptor(s).
6 - Measurement site had a property wall.
7 - Measurement site of residence that will be demolished to make room for an on ramp.
8 Refer to the text in this section for a description of conditions at this location.
R - Minimum required height based on Caltrans Noise Analysis Protocol.
S - Second row receptor.
C - Critical design receiver.
T - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
** The recommended height for each soundwall was determined by the top-of-barrier elevation required for effective abatement at that location.

Source: Parsons, 2005.

Table 3.13-4: Predicted Future Noise and Barrier Analysis**

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1,3] Leq(h), dBA	PREDICTED PEAK HOUR NOISE LEVELS														BARRIER NO./LOCATION
			No Build WITHOUT BARRIER Leq(h), dBA	Build WITHOUT BARRIER Leq(h), dBA	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( ) Leq(h), dBA	IMPACT TYPE (A/E[4] or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)	
								Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
R33	SFR	67 M-ST4	67	68	1	B (67)	A/E	-	-	-	-	-	-	-	-	-	-	No Barrier
R34	SFR	66 E	66	67	1	B (67)	A/E	-	-	-	-	-	-	-	-	-	-	
R35	SFR	62 E	62	64	2	B (67)	None	-	-	-	-	-	-	-	-	-	-	
R36	SFR	68 E	68	69	1	B (67)	A/E	65 T	4	**63** R	6	62	7	61	8	61	8	ROW[8]
R37	SFR	67 E	67	68	1	B (67)	A/E	65 T	3	65	3	64	4	**63** R	5	62	6	
R38 C	SFR	70 E	70	72	2	B (67)	A/E	68 T	4	67	5	65	7	**63** R	9	62	10	
R39	SFR	61 M-ST5	61	62	1	B (67)	None	-	-	-	-	-	-	-	-	-	-	No Barrier
R40	SFR	62 E	62	64	2	B (67)	None	-	-	-	-	-	-	-	-	-	-	
R30	SFR	68 E	67	68	0	B (67)	A/E	65	3	64	4	**62** R,5,T	6	61	7	60	8	Shoulder and ROW[8]
R31	SFR	66 E	65	66	0	B (67)	A/E	65	1	64	2	63	3	62 T	4	**61** R	5	
R32 C	SFR	69 M-LT3	67	69	0	B (67)	A/E	69 T	0	66	3	64	5	**62** R	7	61	8	
R41	SFR	64 E	63	65	1	B (67)	None	-	-	-	-	-	-	-	-	-	-	No Barrier
R55	SFR	69 E	72	72	3	B (67)	A/E	69 T	3	**67** R	5	66	6	65	7	64	8	S80/ Shoulder
R56 C	SFR	71 E	74	74	3	B (67)	A/E	72	2	70	4	**68** R,T	6	67	7	65	9	
R57	SFR	67 M-LT4	73	73	6	B (67)	A/E	70	3	69	4	**67** R,T	6	66	7	64	9	
R58	SFR	66 E	69	69	3	B (67)	A/E	67	2	66	3	64 T	5	**63** R,5	6	62	7	
R59	SFR	63 E	66	67	4	B (67)	A/E	65	2	64	3	63	4	**62** R,T	5	61	6	
R60 C	SFR	71 E	74	75	4	B (67)	A/E	70	5	68	7	66 T	9	**64** R	11	63	12	ROW[8]
R61	SFR	69 E	72	73	4	B (67)	A/E	71	2	69	4	68	5	**66** R,T	7	65	8	
R62	SFR	66 E	68	69	3	B (67)	A/E	66	3	65	4	**64** R,T	5	63	6	62	7	S84/ Bridge and Shoulder
R63	SFR	66 E	68	69	3	B (67)	A/E	66	3	65 T	4	**64** R	5	63	6	63	6	
R64 C	MFR	70 M-ST6	72	73	3	B (67)	A/E	**68** R,T	5	67	6	65	8	64	9	63	10	

Notes:
1 - Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM – hotel/motel.
3 - M - Measured noise level; E - Estimated noise level.
4 - A/E = Approach or Exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptor(s).
6 - Measurement site had a property wall.
7 - Measurement site of residence that will be demolished to make room for an on ramp.
8 Refer to the text in this section for a description of conditions at this location.
R - Minimum required height based on Caltrans Noise Analysis Protocol.
S - Second row receptor.
C - Critical design receiver.
T - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
** The recommended height for each soundwall was determined by the top-of-barrier elevation required for effective abatement at that location.
Source: Parsons, 2005

Table 3.13-4: Predicted Future Noise and Barrier Analysis**

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1,3] Leq(h), dBA	PREDICTED PEAK HOUR NOISE LEVELS														BARRIER NO./LOCATION
			No Build WITHOUT BARRIER Leq(h), dBA	Build WITHOUT BARRIER Leq(h), dBA	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( ) Leq(h), dBA	IMPACT TYPE (A/E[4] or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)	
								Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
R65	MFR	71 E	73	73	2	B (67)	A/E	68 T	5	**66** R	7	65	8	64	9	63	10	
R68	MFR	65 E	65	66	1	B (67)	A/E	65	0	65	1	64 T	2	64	2	63	3	
R69	MH	64 E	65	66	2	B (67)	A/E	66	0	65	1	65 T	1	64	2	64	2	
R70	SFR	72 E	73	74	2	B (67)	A/E	73	1	71	3	69 T	5	**67** R	7	66	8	S90/ ROW
R71	SFR	73 M-LT5	74	75	2	B (67)	A/E	70 T	5	68	7	**66** R	9	65	10	64	11	
R72 C	SFR	75 E	76	76	1	B (67)	A/E	72 T	4	69	7	**67** R	9	66	10	64	12	
R73	SFR	74 E	75	76	2	B (67)	A/E	75	1	74	2	72 T	4	70	6	**68** R	8	
R87 7	SFR	68 M-ST8	71	72	4	B (67)	A/E	-	-	-	-	-	-	-	-	-	-	No Barrier
R90	SFR	62 E	65	66	4	B (67)	A/E	66	0	66	0	65 T	1	64	2	63	3	
R91 6	SFR	64 M-LT7	67	68	4	B (67)	A/E	68	0	67	1	66 T	2	65	3	64	4	
R92A	SFR	61 E	64	65	4	B (67)	A/E	65	0	64	1	64 T	1	63	2	62	3	
R92	SFR	62 E	65	66	4	B (67)	A/E	66	0	66	0	66 T	0	64	2	63	3	No Barrier
R93	SFR	63 E	66	67	4	B (67)	A/E	67	0	67	0	66 T	1	65	2	64	3	
R94	SFR	64 E	67	68	4	B (67)	A/E	68	0	68	0	67 T	1	65	3	64	4	
R95	SFR	64 E	67	67	3	B (67)	A/E	67	0	67	0	66 T	1	65	2	63	4	
R96	MFR	71 E	71	73	2	B (67)	A/E	72	1	71	2	69	4	**68** R,T	5	67	6	
R97 C	MFR	71 E	72	73	2	B (67)	A/E	72	1	71	2	69	4	**68** R,T	5	67	6	
R97A S	MFR	65 E	66	67	2	B (67)	A/E	67	0	67	0	66	1	66	1	65 T	2	S108/ Shoulder and ROW
R98	MFR	70 E	71	72	2	B (67)	A/E	71	1	70	2	69	3	68 T	4	**67** R	5	
R98A	MFR	69 M-ST9	70	71	2	B (67)	A/E	71	0	70	1	69	2	68	3	67	4	
R99	COM	69 E	70	70	1	C (72)	A/E	-	-	-	-	-	-	-	-	-	-	
R100	COM	69 E	70	70	1	C (72)	A/E	-	-	-	-	-	-	-	-	-	-	No Barrier
R101	COM	68 E	69	70	2	C (72)	None	-	-	-	-	-	-	-	-	-	-	

Notes:
1 - Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM – hotel/motel.
3 - M - Measured noise level; E - Estimated noise level.
4 - A/E = Approach or Exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptor(s).
6 - Measurement site had a property wall.
7 - Measurement site of residence that will be demolished to make room for an on ramp.
8 Refer to the text in this section for a description of conditions at this location.
R - Minimum required height based on Caltrans Noise Analysis Protocol.
S - Second row receptor.
C - Critical design receiver.
T - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
** The recommended height for each soundwall was determined by the top-of-barrier elevation required for effective abatement at that location.

Source: Parsons, 2005

Table 3.13-4: Predicted Future Noise and Barrier Analysis**

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1,3] Leq(h), dBA	PREDICTED PEAK HOUR NOISE LEVELS															BARRIER NO./LOCATION
			No Build WITHOUT BARRIER Leq(h), dBA	Build WITHOUT BARRIER Leq(h), dBA	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( ) Leq(h), dBA	IMPACT TYPE (A/E[4] or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)										
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)		
								Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	
R66	SFR	63 E	66	67	4	B (67)	A/E	-	-	-	-	-	-	-	-	-	-	No Barrier
R67	SFR	60 E	63	64	4	B (67)	None	-	-	-	-	-	-	-	-	-	-	
R75	SFR	69 M-ST7	72	73	4	B (67)	A/E	70	3	**68** R,T	5	67	6	66	7	65	8	S91/ Shoulder
R76	SFR	69 E	73	73	4	B (67)	A/E	71	2	70	3	**68** R,T	5	67	6	66	7	
R76A S	SFR	66 E	69	70	4	B (67)	A/E	69	1	68	2	67	3	**65** T	5	64	6	
R77	SFR	68 E	72	72	4	B (67)	A/E	70	2	69	3	68	4	**66** R,T	6	65	7	
R78	SFR	67 E	70	71	4	B (67)	A/E	69	2	68 T	3	66	5	**65** R, 5	6	64	7	
R79 C	SFR	70 E	72	73	3	B (67)	A/E	69	4	68 T	5	66	7	**65** R, 5	8	64	9	
R80A S	SFR	67 E	69	69	2	B (67)	A/E	68	1	66	3	65	4	**64** R, T	5	63	6	
R80	SFR	68 M-LT6	71	71	3	B (67)	A/E	68	3	67 T	4	66	5	**65** R, 5	6	64	7	
R81	SFR	67 E	69	70	3	B (67)	A/E	68	2	67	3	66	4	**65** R,T	5	64	6	
R82	SFR	69 E	72	72	3	B (67)	A/E	70	2	69	3	67	5	**66** R,5,T	6	64	8	
R83	SFR	67 E	70	70	3	B (67)	A/E	69	1	68	2	66	4	**65** R,T	5	64	6	
R84 S, C	SFR	65 E	68	68	3	B (67)	A/E	67	1	66	2	65	3	64	4	**63** R,T	5	S91/ Shoulder of On Ramp S95 Shoulder of the Roadway
R85	SFR	64 E	66	67	3	B (67)	A/E	66	1	65	2	64 T	3	63	4	63	4	
R86	SFR	63 E	65	66	3	C(72)	None	-	-	-	-	-	-	-	-	-	-	
R104	SFR	65 E	67	68	3	B (67)	A/E	-	-	-	-	-	-	-	-	-	-	No Barrier
R105	SFR	63 E	65	66	3	B (67)	A/E	-	-	-	-	-	-	-	-	-	-	
R106	SFR	66 E	68	68	2	B (67)	A/E	-	-	-	-	-	-	-	-	-	-	
R107	SFR	64 E	66	67	3	B (67)	A/E	-	-	-	-	-	-	-	-	-	-	
R108	MOT	73 M	75	76	3	B (67)	A/E	73	3	72	4	70	6	69	7	**67** R,5,T	9	ROW[8]
R109 C	MOT	67 E	69	70	3	B (67)	A/E	68	2	67	3	66	4	65	5	**64** R,T	6	

Notes:

1 - Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM – hotel/motel.
3 - M - Measured noise level; E - Estimated noise level.
4 - A/E = Approach or Exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptor(s).
6 - Measurement site had a property wall.
7 - Measurement site of residence that will be demolished to make room for an on ramp.
8 Refer to the text in this section for a description of conditions at this location.
R - Minimum required height based on Caltrans Noise Analysis Protocol.
S - Second row receptor.
C - Critical design receiver.
T - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
** The recommended height for each soundwall was determined by the top-of-barrier elevation required for effective abatement at that location.

Source: Parsons, 2005

Table 3.13-5: Predicted Future Noise and Barrier Analysis Without Soundwall S95**

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1,3] Leq(h), dBA	PREDICTED PEAK HOUR NOISE LEVELS														BARRIER NO./LOCATION
			No Build WITHOUT BARRIER	Build WITHOUT BARRIER	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (A/E[4] or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)	
			Leq(h), dBA	Leq(h), dBA		Leq(h), dBA		Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
R75	SFR	69 M-ST7	72	73	4	B (67)	A/E	70	3	**68** R,T	5	67	6	66	7	65	8	
R76	SFR	70 E	73	73	3	B (67)	A/E	71	2	70	3	**68** R,T	5	67	6	66	7	
R76A S	SFR	66 E	69	70	4	B (67)	A/E	69	1	68	2	67	3	**65** R,T	5	64	6	
R77	SFR	69 E	72	72	3	B (67)	A/E	70	2	69	3	68	4	**66** R,T	6	65	7	
R78	SFR	67 E	70	71	4	B (67)	A/E	69	2	68 T	3	66	5	**65** R,5	6	64	7	
R79 C	SFR	69 E	72	73	4	B (67)	A/E	69	4	68 T	5	66	7	**65** R,5	8	64	9	
R80A S	SFR	67 E	69	69	2	B (67)	A/E	68	1	66	3	65	4	**64** R,T	5	63	6	S91/ Shoulder and Off Ramp
R80	SFR	68 M-LT6	71	71	3	B (67)	A/E	68	3	67 T	4	66	5	**65** R,5	6	64	7	
R81	SFR	66 E	69	70	4	B (67)	A/E	69	1	67	3	66	4	**65** R,T	5	64	6	
R82	SFR	69 E	72	72	3	B (67)	A/E	70	2	69	3	67	5	66 T	6	**65** R,5	7	
R83	SFR	67 E	70	70	3	B (67)	A/E	69	1	68	2	67	3	66 T	4	**65** R	5	
R84	SFR	65 E	68	68	3	B (67)	A/E	68	0	68	0	67	1	66	2	65	3	
R85	SFR	63 E	66	67	4	B (67)	A/E	67	0	67	0	67	0	66	1	66	1	
R86	COM	63 E	65	66	3	C (72)	None	-	-	-	-	-	-	-	-	-	-	

Notes:
1 - Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM – hotel/motel.
3 - M - Measured noise level; E - Estimated noise level.
4 - A/E = Approach or Exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptor(s).
6 - Measurement site had a property wall.
7 - Measurement site of residence that will be demolished to make room for an on ramp.
8 Refer to the text in this section for a description of conditions at this location.
R - Minimum required height based on Caltrans Noise Analysis Protocol.
S - Second row receptor.
C - Critical design receiver.
T - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
** The recommended height for each soundwall was determined by the top-of-barrier elevation required for effective abatement at that location.

Source: Parsons, 2005

Table 3.13-6: Predicted Future Noise and Barrier Analysis for SR 116 Interchange Option B**

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1,3] Leq(h), dBA	PREDICTED PEAK HOUR NOISE LEVELS														BARRIER NO./LOCATION
			No Build WITHOUT BARRIER Leq(h), dBA	Build WITHOUT BARRIER Leq(h), dBA	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( ) Leq(h), dBA	IMPACT TYPE (A/E[4] or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)	
								Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
R75	SFR	69 M-ST7	72	73	4	B (67)	A/E	70	3	**68** R,T	5	67	6	66	7	65	8	
R76	SFR	70 E	73	73	3	B (67)	A/E	71	2	70	3	**68** R,T	5	67	6	66	7	
R76A S	SFR	66 E	69	70	4	B (67)	A/E	69	1	68	2	67	3	**65** R,T	5	64	6	
R77	SFR	69 E	72	72	3	B (67)	A/E	70	2	69	3	68	4	**66** R,T	6	65	7	
R78	SFR	67 E	70	71	4	B (67)	A/E	69	2	68 T	3	66	5	**65** R,5	6	64	7	
R79 C	SFR	69 E	72	72	3	B (67)	A/E	69	3	68 T	4	66	6	**65** R,5	7	64	8	S91/ Shoulder
R80A S	SFR	66 E	69	69	3	B (67)	A/E	67	2	66	3	65	4	**63** R,T	6	62	7	
R80	SFR	68 M-LT6	71	71	3	B (67)	A/E	68	3	66 T	5	65	6	**64** R,5	7	63	8	
R81	SFR	66 E	69	69	3	B (67)	A/E	67	2	65	4	64 T	5	**63** R,5	6	62	7	
R82	SFR	69 E	72	69	0	B (67)	A/E	66	3	65 T	4	64	5	**63** R,5	6	63	6	
R83 C	SFR	67 E	70	69	2	B (67)	A/E	67	2	66	3	64 T	5	**63** R,5	6	62	7	
R84 S, C	SFR	65 E	68	68	3	B (67)	A/E	67	1	65	3	64	4	63	5	**62** R,T	6	S91/ Shoulder of On Ramp S95 Shoulder of the Roadway
R85	SFR	63 E	66	66	3	B (67)	A/E	65	1	64	2	63	3	62 T	4	**61** R	5	
R86	COM	63 E	65	65	2	C (72)	None	-	-	-	-	-	-	-	-	-	-	

Notes:
1 - Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM – hotel/motel.
3 - M - Measured noise level; E - Estimated noise level.
4 - A/E = Approach or Exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptor(s).
6 - Measurement site had a property wall.
7 - Measurement site of residence that will be demolished to make room for an on ramp.
8 Refer to the text in this section for a description of conditions at this location.
R - Minimum required height based on Caltrans Noise Analysis Protocol.
S - Second row receptor.
C - Critical design receiver.
T - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
** The recommended height for each soundwall was determined by the top-of-barrier elevation required for effective abatement at that location.

Source: Parsons, 2005

Table 3.13-7: Predicted Future Noise and Barrier Analysis for SR 116 Interchange Option B Without Soundwall S95**

REC. NO.	LAND USE[2]	EXISTING NOISE LEVELS[1,3] Leq(h), dBA	PREDICTED PEAK HOUR NOISE LEVELS														BARRIER NO./LOCATION
			No Build WITHOUT BARRIER Leq(h), dBA	Build WITHOUT BARRIER Leq(h), dBA	NOISE INCREASE OR DECREASE	ACTIVITY CATEGORY and NAC ( ) Leq(h), dBA	IMPACT TYPE (A/E[4] or NONE)	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
								2.4 m (8 ft)		3.0 m (10 ft)		3.7 m (12 ft)		4.3 m (14 ft)		4.9 m (16 ft)	
								Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
R75	SFR	69 M-ST7	72	73	4	B (67)	A/E	70	3	**68** R,T	5	67	6	66	7	65	8	
R76	SFR	70 E	73	73	3	B (67)	A/E	71	2	70	3	**68** R,T	5	67	6	66	7	
R76A S	SFR	66 E	69	70	4	B (67)	A/E	69	1	68	2	67	3	**65** R,T	5	64	6	
R77	SFR	69 E	72	72	3	B (67)	A/E	70	2	69	3	68	4	**66** R,T	6	65	7	
R78	SFR	67 E	70	71	4	B (67)	A/E	69	2	68 T	3	66	5	**65** R,5	6	64	7	
R79 C	SFR	69 E	72	72	3	B (67)	A/E	69	3	68 T	4	66	6	**65** R,5	7	64	8	
R80A S	SFR	67 E	69	69	2	B (67)	A/E	67	2	66	3	65	4	**64** R,T	5	63	6	S91/ Shoulder and Off Ramp
R80	SFR	68 M-LT6	71	71	3	B (67)	A/E	68	3	66 T	5	65	6	**64** R,5	7	63	8	
R81	SFR	66 E	69	69	3	B (67)	A/E	67	2	66	3	65 T	4	**64** R	5	63	6	
R82	SFR	69 E	72	69	0	B (67)	A/E	67	2	66 T	3	64 T	5	**63** R,5	6	63	6	
R83	SFR	67 E	70	69	2	B (67)	A/E	67	2	66	3	65 T	4	**64** R	5	64	5	
R84 S	SFR	65 E	68	68	3	B (67)	A/E	68	0	67	1	67	1	66	2	66 T	2	
R85	SFR	63 E	66	66	3	B (67)	A/E	66	0	66	0	66	0	66	0	65	1	
R86	COM	63 E	65	65	2	C (72)	None	-	-	-	-	-	-	-	-	-	-	

Notes:
1 - Existing and predicted "without barrier" noise levels include benefits provided by the existing soundwall.
2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile home; HM – hotel/motel.
3 - M - Measured noise level; E - Estimated noise level.
4 - A/E = Approach or Exceed NAC.
5 - Barrier height recommended to meet requirements at adjacent receptor(s).
6 - Measurement site had a property wall.
7 - Measurement site of residence that will be demolished to make room for an on ramp.
8 Refer to the text in this section for a description of conditions at this location.
R - Minimum required height based on Caltrans Noise Analysis Protocol.
S - Second row receptor.
C - Critical design receiver.
T - Height required to cut the line-of-sight from first row receptors to heavy truck stacks.
** The recommended height for each soundwall was determined by the top-of-barrier elevation required for effective abatement at that location.

Source: Parsons, 2005

Soundwall combination S91 and S95 (SR 116 Interchange Option A) would be along the southbound side of Highway 101 between Richardson Lane and Highway 116, and Soundwall S95 would be located along the southbound side of Highway 101. Soundwall S95 would span the Highway 116 overpass bridge. When combined with Soundwall S95, Soundwall S91 would protect two more single-family residences (represented by receptor R84) from highway traffic noise, under bridge option A. A total of 26 single-family residences would be protected by this soundwall combination.

Soundwall S91 (SR 116 Interchange Option B) would be along the southbound side of Highway 101 between Richardson Lane and Highway 116. The soundwall would be along the shoulder of the highway and would end at the southbound Highway 101 on-ramp from Highway 116. The wall would provide protection for 24 single-family residences (represented by receptors R75 to R83) from highway traffic noise.

Soundwall combination S91 and S95 (SR 116 Interchange Option B) would be on the southbound side of Highway 101 between Richardson Lane and Highway 116, along the shoulder of the highway, and would end at the southbound Highway 101 on-ramp from Highway 116. Soundwall S95 would be along the southbound side of Highway 101 and would span Highway 116 overpass bridge. Soundwall S91, when combined with Soundwall S95, would protect four more single-family residences (represented by receptors R84 and R85) from highway traffic noise. A total of 28 single family residences would be protected by this soundwall combination.

Soundwall S108 would be on the northbound side of Highway 101 from just before Arlene Drive to Copeland Creek. The soundwall would reduce highway traffic noise at six multi-family buildings with 15 affected first floor units (represented by receptors R96 to R98). Soundwall S108 cannot be positioned at the ideal location for noise abatement, since it would take away public access to a portion of the Caltrans right-of-way that is currently being used as bicycle/pedestrian trail. Therefore, the soundwall was positioned between the public area and Highway 101, which results in a loss of benefit to the apartment building represented by R98A.

Locations Where Soundwalls Would Exceed Reasonable Allowance

Soundwalls at the following receptor locations would achieve a 5-dbA reduction in traffic noise and be feasible to construct, but would not be cost-effective as determined by Caltrans' Calculated Reasonable Allowance per Residence. (Reasonable and feasible determinations are discussed in Section 3.13.1, Regulatory Setting.) The receptor locations for these areas are shown in Appendix A, Build Alternative Plan Drawings. The following paragraphs describe the locations.

Receptor 10 represents the pool area at the Dollar Inn motel, which is on the east side of Highway 101, just north of Old Redwood Highway. Although the analysis indicates that the future traffic noise would exceed the NAC at this location, the soundwall required to abate highway traffic noise for this single area would be approximately 155 meters (508 feet) long.

Receptors R12, R13, and R14 represent six single-family residences on the west side of Highway 101 in the vicinity of Orchard Lane. A soundwall to protect these six residences from highway traffic noise would be 440 meters (1,444 feet) long.

Receptors R15, R16, and R17 represent three single-family residences on the east side of Highway 101, near Orchard Lane. The soundwall required to abate highway traffic noise for these three residences would be 434 meters (1,424 feet) long.

Receptors R30, R31, and R32 represent five single-family residences on the east side of Highway 101, north of West Railroad Avenue. The soundwall required to abate highway traffic noise for these residences would be approximately 660 meters (2,165 feet) long.

Receptors R36, R37, and R38 represent three single-family residences on the west side of Highway 101, north of West Railroad Avenue. The soundwall required to abate highway traffic noise for these residences would be 311 meters (1,020 feet) long.

Receptors R60 and R61 represent two single-family residences on the west side of Highway 101, south of West Sierra Avenue. The soundwall required to abate traffic noise for these two residences would be 210 meters (689 feet) long.

Receptor R109 represents the motel pool area at the Rohnert Park Best Western motel on the west side of Highway 101, south of the Rohnert Park Expressway. The soundwall required to abate highway traffic noise at the pool would be approximately 520 meters (1,706 feet) long.

Areas Where Noise Abatement Is Not Warranted or Feasible

Some areas along the project corridor would receive noise impacts for which there is no apparent feasible and reasonable abatement. State guidelines for reasonable and feasible determinations are discussed in Section 3.13.1, Regulatory Setting. The receptor locations for these areas are shown in Appendix A, Build Alternative Plan Drawings. The following paragraphs describe the locations and explain why abatement is not feasible or reasonable.

Receptor R9 represents the Quality Inn motel that is along the northbound side of Highway 101 near the Old Redwood Highway. A soundwall along the on-ramp alignment would not attenuate traffic noise from the Old Redwood Highway; therefore it would not achieve the required 5-dBA benefit. There is no other location in this area to place a soundwall.

Receptors R18 and R19 represent single-family residences on the southbound side of Highway 101 near the Pepper Road access ramp to southbound Highway 101. The receptors are near Stony Point Road, which is a contributing noise source. Because a soundwall along the Pepper Road access ramp would not attenuate traffic noise from Stony Point Road, the soundwall would not achieve the required 5-dBA noise reduction. There is no other location in this area to place a soundwall.

Receptors R33 to R35 represent single-family residences on the southbound side of Highway 101 just north of West Railroad Avenue. It is not feasible to construct a soundwall in this area due to the topographical characteristics at this location.

Receptor R41 represents a single-family residence on the northbound side of Highway 101 between stations 73+00 and 74+00. It is not feasible to abate for highway traffic noise in this area due to the distance between R41 and the highway.

Receptors R66 to R67 are on the southbound side of Highway 101 just north of West Sierra Avenue. It is not feasible to construct a soundwall in this area due to the topographical characteristics at this location.

Receptors R84 and R85 represent single-family residences located on the southbound side of Highway 101 just south of SR 116. Traffic noise at these receptors cannot be abated with Soundwall S91 alone due to the topographical characteristics at this location. If a soundwall is placed at the edge of southbound Highway 101 along the bridge portion that extends over Highway 116 (Soundwall 95), R84 would benefit (two single-family residences) under bridge option A. Both receptors (four single-family residences) would benefit from the soundwall combination under bridge option B. (Refer to the discussion in this section of Soundwall S91 and Soundwall combination S91 and S95).

Receptor R87 represents two single-family residences on the northbound side of Highway 101 just north of the Highway 116 underpass. The residences would be acquired for highway right-of-way.

Receptors R90 to R95 represent single-family residences along the northbound side of Highway 101 between Southwest Boulevard and Arlene Drive. It is not feasible to abate the traffic noise due to an existing property wall. The addition of a new soundwall would not result in a 5-dBA decrease in the traffic noise level, since the existing wall is already achieving close to the maximum noise reduction that is possible.

Receptor R98A represents two multi-family residences with three affected first-floor units on the northbound side of Highway 101, just south of Copeland Creek. It is not feasible to abate the highway traffic noise in this area due to a public bicycle/pedestrian trail located between the residences and Highway 101. A soundwall could not be placed in this area so that it would properly abate the traffic noise for this receptor without disrupting the function of the trail.

Receptors R104 to R107 represent single-family residences on the southbound side of Highway 101 between Copeland Creek and Redwood Drive. It is not feasible to abate the highway traffic noise in this area due to the distance of the residences from the highway and a partial shielding effect provided by intervening commercial buildings.

3.14 Energy

As the impact of the project in context of the countywide travel model is too small to demonstrate substantial energy impacts, in accordance with Caltrans' Standard Environmental Reference Guidelines,[2] a qualitative energy analysis was conducted. The information presented in this section is taken from the technical memorandum, *Technical Memorandum on Energy Impacts for the Highway 101 HOV Lane Widening and Improvements Project: Old Redwood Highway, Petaluma to Rohnert Park Expressway, Rohnert Park* (Parsons 2005).

The energy impacts of transportation projects are typically divided into two components: (1) the direct energy required for ongoing operations, in this case, the use of petroleum-based fuels and alternative fuels for motor vehicle travel within the project area, and (2) the indirect energy required to produce the materials for and to carry out construction of the project. In the long term, the direct, or operating, energy requirements are usually greater and of primary importance. This discussion, therefore, focuses on the direct energy requirements for ongoing Highway 101 operations with and without the proposed project.

By 2030, without capacity improvements to Highway 101, congested traffic conditions would prevail in the traffic study area; the freeway would be unable to serve the projected demand. Due to insufficient mainline capacity for the forecast volumes, bottlenecks and queues would develop at certain locations along the mainline. Low travel speeds and long delays would be prevalent during peak hours. Such congested traffic conditions contribute to inefficient energy consumption as vehicles use extra fuel while idling in stop-and-go traffic or moving at slow speeds on a congested roadway.

While the Build Alternative would not eliminate all capacity problems in 2030, it would allow the highway to carry on average about 12 percent more of the total peak-hour travel demand than the No-Build Alternative. Under no-build conditions, Highway 101 within the traffic study area would be able to accommodate only 84 percent of forecast 2030 travel demand.

The Build Alternative would improve average travel speeds and thereby reduce average travel times during both peak hours. Improved travel speeds would translate to a 26 to 42 percent reduction in travel time. The Build Alternative would reduce peak-hour delay at some bottlenecks by over 90 percent. It would reduce overall delay by five to 10 minutes, a 51 to 88 percent reduction, depending on the peak hour (a.m. and p.m.) and direction.

By removing bottlenecks in the study area, reducing delay and improving travel times, the Build Alternative also would reduce traffic diversion to local streets ("cut-through" traffic) by commuters who under no-build conditions, would divert to local streets to avoid bottlenecks and traffic queues on the mainline.

[2] Source: http://www.dot.ca.gov/ser/vol1/sec3/physical/ch13energy/chap13.htm

The computer model used to study future traffic conditions concludes that the Build Alternative would reduce the countywide vehicle miles traveled (VMT) and countywide vehicle hours traveled (VHT) when compared to the No-Build Alternative.[3] Under the Build Alternative, annual countywide VMT would decrease by 31 million kilometers (19 million miles) and annual countywide VHT would decrease by two million hours when compared to the No-Build Alternative. These reductions reflect improved travel times and reduced delay under the Build Alternative. Because vehicle energy consumption is directly proportional to VMT, lower VMT under the Build Alternative would translate to energy savings.

The HOV lanes provided under the Build Alternative would offer dedicated peak hour capacity and a high level of traffic service to transit and carpool vehicles, which would substantially improve travel time for intercity buses and carpooling commuters. Not only would transit travel time be reduced but transit schedule reliability would be improved. The improved speeds and schedule reliability would work as incentives for commuters and other travelers to carpool and/or take advantage of local and express buses that would move freely along the HOV lanes. To the extent that benefits to HOV lane users influence more single-occupant-vehicle drivers to switch to HOVs, the Build Alternative would contribute to energy savings. The proposed project is anticipated to have no adverse impact on direct energy use compared to the No-Build Alternative. No energy mitigation measures would be needed.

[3] The countywide VMT represents the total distance traveled by all vehicles in Sonoma County and countywide VHT represents the total hours traveled by all vehicles in Sonoma County.

3.15 Biological Environment

A Draft Natural Environment Study/Biological Assessment (NES/BA) (Parsons 2006), *Preliminary Wetland Delineation Report* (Parsons 2005), *Initial Site Assessment for the California Tiger Salamander and California Red-legged Frog* (Parsons 2003), and a *California Red-legged Frog Report*, Parsons, 2005 were prepared for the Highway 101 HOV Lane Widening Project. Biological resource studies consisted of a comprehensive records and literature search, a reconnaissance survey of the entire project corridor, habitat assessment and protocol surveys for special-status plant and wildlife species, and a delineation/assessment of wetlands and other waters of the United States (U.S.). *A Focused Corridor Biological Assessment for the Sonoma County Distinct Population Segment (DPS) of the California Tiger Salamander* (Parsons, 2004) was prepared and submitted to the U.S. Fish and Wildlife Service (USFWS) to initiate formal consultation under Section 7 of the Federal Endangered Species Act. A *Biological Assessment for Fish Species* was also prepared and will be submitted to the National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) to initiate consultation under Section 7 for potential impacts to anadromous fish species under NOAA Fisheries jurisdiction. This section of the environmental document presents findings of these reports and studies for vegetation and wildlife communities, wetlands and other waters of the U.S., threatened and endangered species, and invasive species.

3.15.1 Natural Communities

3.15.1.1 AFFECTED ENVIRONMENT

Land uses along the proposed project are primarily rural and agricultural, as described in Section 3.2.1, Existing and Future Land Use. Vegetation is mostly ruderal/disturbed, non-native grassland, ornamental landscape planted with coast redwood (*Sequoia sempervirens*), and agricultural planted with grapes (*Vitis vinifera*); there are few remaining natural areas. Various waterways traverse the corridor, some in concrete-lined channels or culverts and others in their natural watercourse.

Five biological communities occur in the vicinity of the project corridor: non-native annual grassland; ruderal/disturbed, including ornamental landscape and agriculture; seasonal and freshwater emergent wetlands; willow riparian scrub; and coyote brush scrub. Preliminary investigations indicate that it is highly unlikely that the project area contains vernal pools or Santa Rosa Plain listed plants. Protocol-level presence/absence surveys are ongoing. These plant species are discussed further in Section 3.15.3.2, paragraph two.

A description of each community and its associated wildlife assemblage is provided below.

Non-Native Grassland

This community is typically found on fine-textured soils, which may range from moist, possibly even waterlogged during the rainy season, to very dry during the dry season. It is primarily composed of non-native annual grasses although native annual forbs ("wildflowers") may also be present during years of favorable precipitation. Non-native grassland communities are found in the valleys and foothills throughout much of California. Characteristic species include wild oats (*Avena* spp.), bromes (*Bromus* spp.), Italian ryegrass (*Lolium multiflorum*), California poppy (*Eschscholzia californica*), lupine (*Lupinus* spp.), and baby blue-eyes (*Nemophila menziesii*).

Grasslands provide foraging and nesting habitat for a wide variety of wildlife species including raptors, seed eating birds, small mammals, amphibians, and reptiles. Wildlife species typically associated with grasslands include western skink (*Eumeces skiltonianus*), Pacific gopher snake (*Pituophis melanoleucus catenifer*), common garter snake (*Thamnophis sirtalis*), deer mouse (*Peromyscus maniculatus*), western harvest mouse (*Reithrodontomys megalotis*), California vole (*Microtus californicus*), mule deer (*Odocoileus hemionus*), western meadowlark (*Sturnella neglecta*), and savannah sparrow (*Passerculus sandwichensis*). Grasslands also provide important foraging habitat for raptors such as the American kestrel (*Falco sparverius*), white-tailed kite (*Elanus leucurus*), northern harrier (*Circus cyaneus*), and red-tailed hawk (*Buteo jamaicensis*).

Non-native grasslands within the project vicinity are found on Meacham Hill. The dominant plant species in this community within the project area include wild oats, bromes, and Italian ryegrass.

Ruderal/Disturbed, Including Urban Ornamental Landscape and Agriculture

A distinguishing characteristic of urban habitats is the mixture of native and exotic plant species. Exotic plant species may provide valuable habitat elements such as cover for nesting and roosting, as well as food sources such as nuts or berries. Native and introduced animal species that are tolerant of human activities often thrive in urban habitats. These species include western fence lizard (*Sceloporus occidentalis*), barn swallow (*Hirundo rustica*), European starling (*Sturnus vulgaris*), house sparrow (*Passer domesticus*), house finch (*Carpodacus mexicanus*), house mouse (*Mus musculus*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), and Virginia opossum (*Didelphis virginianus*).

Common weeds found along the project corridor included Italian ryegrass, wild oats, tall mustard (*Sisymbrium altissimum*), Harding grass (*Phalaris aquatica*), bristly ox-tongue (*Picris echioides*), sow thistle (*Sonchus asper*), wild lettuce (*Lactuca serriola*), and paniculate willow-herb (*Epilobium brachycarpum*). Ornamental landscape plants associated with these weeds included periwinkle (*Vinca major*), English ivy (*Hedera helix*), oleander (*Nerium oleander*), and coast redwood (*Sequoia sempervirens*).

Agricultural areas in the project vicinity include pastureland, vineyards, and row crops.

Seasonal and Freshwater Emergent Wetlands

Seasonal wetlands, including the aquatic environments of the floor of flood control channels, are often formed when ditches and depressions are excavated. Freeway ditches develop into seasonal wetlands by becoming populated by plants species such as semaphore grass (*Pleuropogon californicus*), spikerush (*Eleocharis macrostachya*), water knotweed (*Polygonum lapathifolium*), water evening primrose (*Ludwigia peploides*), pennyroyal (*Mentha pulegium*), rabbitsfoot grass (*Polypogon monspeliensis*), barnyard grass (*Echinochloa crusgallii*), and eragrostoid sedge (*Cyperus eragrostis*). These plant species are either low-growing, tenacious perennials that tolerate the annual maintenance activities being carried out in the channels and ditches, or are annuals that tolerate seasonal wetness and mowing, but later die after producing seed for the next season. The edges of such wetlands are often dominated by non-native annual weeds including annual ryegrass (*Lolium multiflorum*), alkali mallow (*Malvella leprosa*), peppergrass (*Lepidium latifolium*), and bristly ox-tongue (*Picris echioides*). At Denman Flat, a seasonal wetland exists that is dominated by pennyroyal.

Freshwater marshes are among the most productive wildlife habitats in California. They provide food, cover, and water for more than 160 species of birds as well as a variety of mammals, reptiles, and amphibians. Species that could use these areas in the project vicinity include Pacific tree frogs (*Hyla regilla*), bullfrogs (*Rana catesbeiana*), red-winged blackbird (*Agelaius phoeniceus*), song sparrow (*Melospiza melodia*), yellow warbler (*Dendrocia petechia*), voles (*Microtis* spp.), shrews (*Sorex* spp.), and deer mouse.

Seasonal and freshwater emergent wetlands occur at the ditches near Old Redwood Highway, the seasonal wetlands north of Denman Flat, in the headwaters and tributaries to Laguna de Santa Rosa, and the ditches near SR 116. No vernal pools or swales were identified within the project vicinity.

Willow Riparian Scrub

This community is found on relatively fine-grained alluvial soils and clays located in the floodplains of sub-perennial streams along canyons and creeks of the Coast Ranges. Characteristic species include red willow (*Salix laevigata*) and shining willow (*S. lucida* ssp. *lasiandra*).

Examples of wildlife that may occur in this community include Pacific tree frog, bushtit (*Psaltriparus minimus*), Wilson's warbler (*Wilsonia canadensis*), black phoebe (*Sayornis nigricans*), Anna's hummingbird (*Calypte anna*), spotted towhee (*Pipilo maculatus*), raccoon, Virginia opossum, European starling, American crow (*Corvus brachyrhynchos*), Western scrub jay (*Aphelocoma californica*), house finch, house mouse, and Norway rat (*Ratus norvegicus*).

Willow riparian scrub was found along Copeland Creek and the Laguna de Santa Rosa in the Highway 101 corridor.

Coyote Brush Scrub

Considered by some ecological workers as the northern version of soft chaparral, coyote brush scrubs are most prevalent on coastal slopes. However, inland scrubs that are dominated by *Baccharis* species are often associated with old disturbed sites, and thus may reflect a seral stage in the development of woodlands from bare ground. The dominant species is coyote brush (*Baccharis pilularis* var. *consanguinea*) but may also include species of buck brush (*Ceanothus* species), poison oak (*Toxicodendron diversilobum*), and cow parsnip (*Heracleum lanatum*), together with a whole host of annual forbs and grasses.

Coyote brush scrub provides foraging and nesting habitat for a wide variety of wildlife species including raptors, seed eating birds, small mammals, amphibians, and reptiles (see section on non-native grassland).

Coyote brush scrub was found in the vicinity of Willow Brook and on the north side of Meacham Hill near the headwaters of Laguna de Santa Rosa Creek.

3.15.1.2 ENVIRONMENTAL CONSEQUENCES

The No-Build Alternative would not result in new construction that would involve impacts to the biological environment in the project vicinity. Project effects on natural communities that would result from the Build Alternative are shown in Table 3.15-1. Mitigation measures for these impacts are proposed by respective vegetation community type in the following paragraphs.

Table 3.15-1: Impacts to Natural Communities for the Build Alternative (hectares/acres)

Affected Natural Communities	Area of Impact
Ruderal/Disturbed	16.0 ha/40.0 ac
Non-native Grassland	1.06 ha/2.61 ac
Seasonal/Freshwater Emergent Wetland/Open Water	0.19 ha/0.48 ac
Willow Riparian Scrub	0.03 ha/0.08 ac
Coyote Brush Scrub	0.38 ha/0.94 ac

Ruderal/Disturbed

The proposed project would permanently displace up to 16.0 ha (40.0 ac) of ruderal/disturbed vegetation at various locations along the Highway 101 corridor within the project limits.

Non-native Grassland

Approximately 1.06 ha (2.61 ac) of non-native grassland would be permanently displaced by the proposed project between Pepper Road and West Railroad Avenue.

Seasonal/Freshwater Emergent Wetlands

The proposed project would affect up to 0.19 ha (0.48 ac) of seasonal and freshwater emergent wetlands and open water in ditches near Old Redwood Highway, at Willow Brook, in seasonal wetlands north of Denman Flat, in the headwaters and tributaries to Laguna de Santa Rosa, and in ditches near SR 116.

Willow Riparian Scrub

Impacts to approximately 0.03 ha (0.08 ac) of willow riparian scrub located along Copeland Creek and the Laguna de Santa Rosa tributaries could occur as a result of bridge construction in those areas.

Coyote Brush Scrub

Approximately 0.38 ha (0.94 ac) of coyote brush scrub habitat in the vicinity of Willow Brook and the Laguna de Santa Rosa tributaries could be disturbed.

3.15.1.3 Avoidance, Minimization, and/or Mitigation Measures

The project has been designed to use existing right-of-way to the greatest extent feasible, thus avoiding or reducing new construction in natural habitat areas. The majority of the widening could be accomplished within the existing roadway median. Retaining walls and side slopes steeper than standard would be constructed at several locations to minimize right-of-way takes and natural community impacts. Linear patches and disjunct segments of ruderal/disturbed vegetation and non-native grassland would be permanently affected by Highway 101 project construction. These losses are not considered to be adverse because other vegetation community areas within the project vicinity are of higher quality and would be used by wildlife as an alternative and preferable habitat source. Compensation measures for unavoidable impacts to willow/riparian and coyote brush scrub vegetation communities potentially affording habitat for special-status species and to jurisdictional wetlands and other waters of the U.S. are described in their respective sections below.

3.15.2 Wetlands and Other Waters of the United States

3.15.2.1 Regulatory Setting

Three primary regulations apply to undertakings that may affect wetlands or other waters of the United States, as follows:

Section 404, Clean Water Act

As established in Section 404 of the Clean Water Act (33 U.S.C. 1344), the U.S. Army Corps of Engineers (USACE) has final authority over the identification of wetlands and other waters of the U.S. in the project vicinity, including their jurisdiction, determination of area affected by the project, and type of permits and conditions required. Section 404 prohibits the discharge of dredged or fill material into waters of the U.S. without a permit from the USACE. In order for a project that affects wetlands to be approved and a permit to be obtained, it must be demonstrated that the proposed

project is the least environmentally damaging. A "no net loss of wetland acreages or values" policy is established for mitigation of wetland impacts.

The USACE also administers the Habitat Quality Evaluation (HQE) process. This process was developed by the Sonoma County Vernal Pool Task Force[4] with the purpose of identifying wetland areas in the Santa Rosa Plain that potentially contain rare plant and animal species. These areas are further studied for their potential to be used for wetland and rare species protection, wetland creation, restoration, or enhancement.

Section 401, Clean Water Act

Concurrent with the determination of a project's qualifications for an USACE permit is certification of the project's compliance with California State water quality standards as regulated by the Regional Water Quality Control Board (RWQCB) under Section 401 of the Clean Water Act. The water quality certification may include waste discharge requirements.

Section 1600 et. Seq., California Fish and Game Code

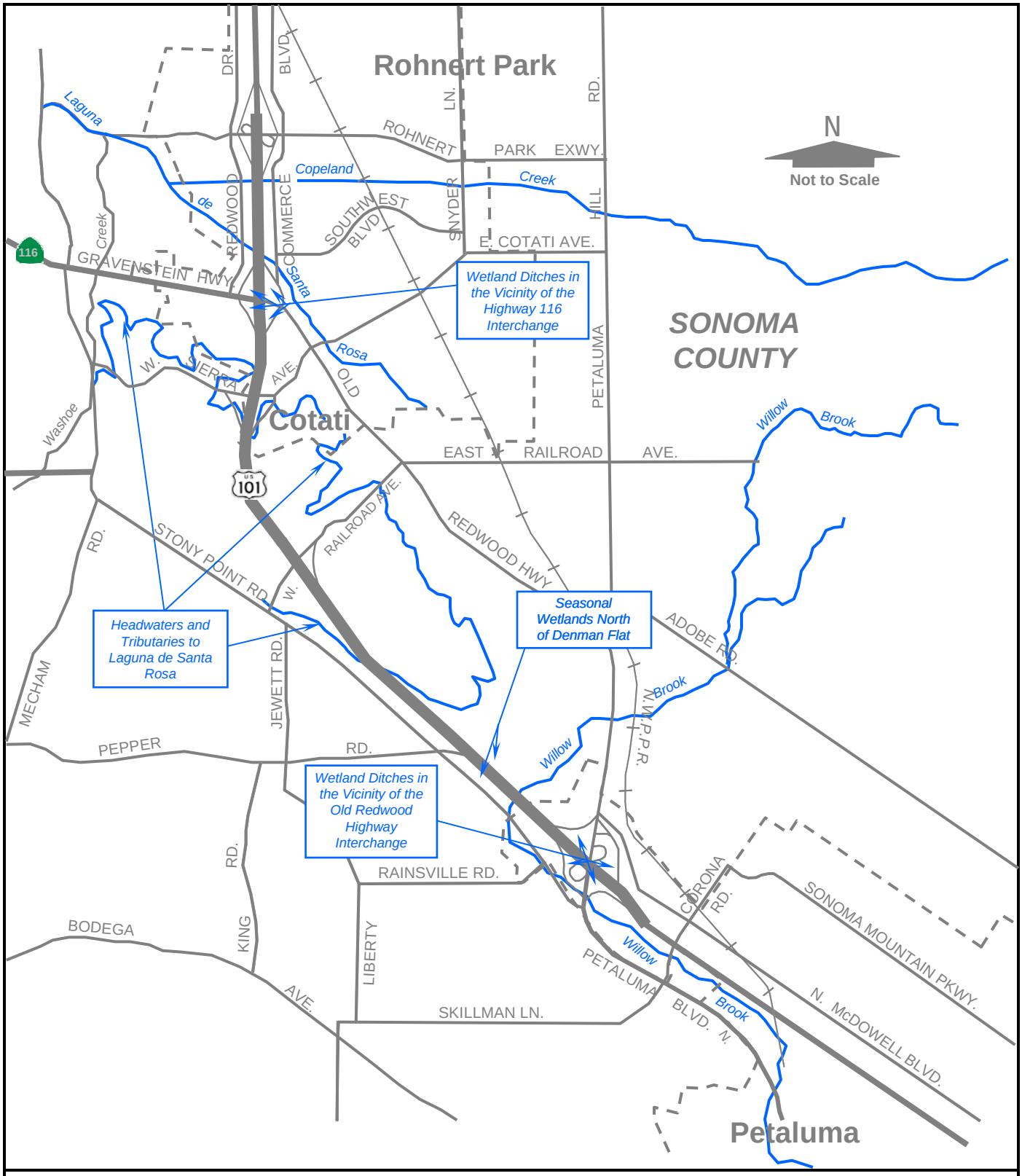
Actions that have the potential to alter a streambed or discharge materials into a stream must obtain a Streambed Alteration Agreement ("1602 permit") with the California Department of Fish and Game (CDFG) in accordance with Section 1600 and following of the California Fish and Game Code. The Streambed Alteration Agreement effectively applies to any construction work between the banks of a stream or within the floodplain of a waterway. The agreement typically establishes seasonal limits or work windows for construction activities.

3.15.2.2 AFFECTED ENVIRONMENT

A delineation of potential jurisdictional wetlands and other waters of the U.S. in the proposed project vicinity was conducted on April 22, June 19, July 1, July 16, July 17, July 19, July 29, and July 30, 2003 in accordance with the Routine On-Site Determination Method as defined by the USACE. This delineation will be submitted to the USACE for jurisdictional determination.

The jurisdictional features that were delineated along Highway 101 are shown on Figure 3.15-1 and on the Wetland Delineation Maps in Appendix G. Jurisdictional wetlands are determined by the presence of three indicators: wetlands soils, wetlands vegetation, and hydrology, or period of inundation. Other waters of the U.S. must possess a defined bed and bank and an ordinary high water mark (OHWM).

[4] The Vernal Pool Task Force was composed of federal, state, and local agencies, local development and agricultural interests, and local environmental groups.



Legend:

City Boundary | Project Limits | Creeks and Creek Tributaries

SCTA

Highway 101 HOV Lane Widening Project: Old Redwood Highway, Petaluma to Rohnert Park Expressway, Rohnert Park

LOCATIONS OF WETLANDS AND OTHER WATERS OF THE U.S.
Figure 3.15-1

The wetland delineation also served to demonstrate the likely absence of vernal pools in the project area. Protocol-level presence/absence surveys for vernal pool listed plant species are ongoing to complete the Habitat Quality Evaluation (HQE) process as required pursuant to San Francisco USACE final regional conditions affecting Nationwide Permits for projects within the Santa Rosa Plain. Based on preliminary surveys, it is not anticipated that any of the four listed vernal pool plant species will be identified within the immediate project vicinity. Final survey results and results of any consultation with the USACE and USFWS will be reported in the final environmental document.

3.15.2.3 ENVIRONMENTAL CONSEQUENCES

The No-Build Alternative would not result in new construction that would affect wetlands or other waters of the U.S. in the project corridor. Depending on the option selected at the Highway 101/SR 116 Interchange, the proposed project Build Alternative would permanently affect up to 0.194 ha (0.479 acres)[5] of wetlands and other waters of the U.S.. Both permanent and temporary (construction phase) impact areas are shown on the Wetland Delineation Maps in Appendix G. Table 3.15-2 reports the amounts of wetland or other waters resources within the project limits that would be permanently or temporarily filled.

Based on the amount of total permanent impacts to wetlands and other waters of the U.S.—which is just less than 0.5 acres combined—it is anticipated that the project would qualify for one or more nationwide Section 404 permits, and an individual permit would not be required. It is also anticipated that a Section 1602 Streambed Alteration Agreement with the CDFG would be required prior to construction.

Table 3.15-2: Impacts to Wetlands and Other Waters of the U.S. Highway 101 HOV Lane Widening Project

Location	SR 116 Interchange Option A		SR 116 Interchange Option B	
	Permanent	Temporary	Permanent	Temporary
	hectares / acres		hectares / acres	
Total Wetlands	0.167 / 0.412	0.117 / 0.289	0.174 / 0.429	0.120 / 0.296
Total Other Waters of the U.S.	0.020 / 0.050	0.011 / 0.026	0.020 / 0.050	0.011 / 0.026
Total Wetlands/Waters Impacts	**0.187 / 0.462**	**0.128 / 0.315**	**0.194 / 0.479**	**0.131 / 0.322**

Source: Parsons, 2006

3.15.2.4 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

The project was designed to have the least possible impacts on wetlands and waters of the U.S. The majority of the widening would occur in the median of the roadway. Retaining walls and side slopes steeper than standard would be constructed at several locations to minimize right-of-way takes and

impacts to wetlands and other waters of the U.S. Compensation requirements for impacts to wetlands and other waters of the U.S. will be determined through consultation with the USACE and Regional Water Quality Control Board, which will establish the compensation ratio and other measures to be implemented, based on their review of this *Environmental Assessment/Environmental Impact Report*, the *Wetlands Delineation Report*, and the *Natural Environment Study/Biological Assessment (NES/BA)*. Compensation measures will be identified for both permanent and temporary (construction phase) impacts of the project to ensure no net loss of wetlands.

It is recommended that Caltrans and its partners purchase wetland creation/enhancement credits at an USACE-approved mitigation bank. Alternatively, Caltrans and FHWA will consult with the USACE to identify on-site locations to create or enhance seasonal freshwater marsh and wetlands at ratios to ensure no net loss. In this case, Caltrans and FHWA would develop a wetlands compensation plan that will describe the conceptual wetlands creation/enhancement approach, identify the site and preferred plants, and establish performance criteria. Either of these measures will compensate for project effects to wetlands. The USACE's review would be completed and the final compensation measures identified before the *Finding of No Significant Impact/Final Environmental Impact Report* is approved.

3.15.3 Threatened and Endangered Species

Special-status plant and wildlife species are species that have been afforded special recognition and protection by federal, state, or local resource conservation agencies and organizations. These species are generally considered rare, threatened, or endangered due to declining or limited populations. For purposes of this environmental document, candidate threatened or endangered species were addressed in the same manner as listed species, since they could be listed during later stages of project development.

3.15.3.1 REGULATORY SETTING

A variety of laws seek to identify, avoid, minimize and mitigate for impacts to special-status wildlife and plant species, as summarized in the following paragraphs.

Federal Endangered Species Act

The Secretary of the Interior and the Secretary of Commerce are responsible under the Federal Endangered Species Act of 1973 (ESA) for identifying endangered and threatened species and their critical habitat, carrying out programs for species conservation, and rendering opinions regarding the impact of proposed federal actions on endangered species. The ESA also outlines what constitutes unlawful taking, importation, sale, and possession of endangered species and specifies civil and criminal penalties for unlawful activities.

[5] Total impacts to wetlands/other waters under Option B at the Highway 101/SR 116 Interchange.

Biological assessments are required under Section 7(c) of the ESA if listed species or critical habitat may be present in the area affected by any major construction activity conducted by, or subject to issuance of a permit from, a federal agency as defined in Part 404.02. Under Section 7(a)(3) of the ESA, every federal agency is required to consult with the United States Fish and Wildlife Service (USFWS) or National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) on a proposed action if the agency determines that its undertaking may affect an endangered or threatened species.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1918 makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in CFR Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR 21). The MBTA also prohibits disturbance or harassment of nesting migratory birds at any time during their breeding season.

California Endangered Species Act

The California Endangered Species Act (CESA, Fish and Game Code Sections 2050-2098) establishes State policy to conserve, protect, restore, and enhance any endangered species or any threatened species and its habitat. The Fish and Game Commission is charged with establishing a list of endangered and threatened species. State agencies must consult with the California Department of Fish and Game (CDFG) to determine if a proposed project has the potential to jeopardize the continued existence of listed endangered, threatened, or candidate species.

The CDFG Code defines "take" (Section 86) and prohibits "taking" of species that are listed under the CESA, or fully protected under CDFG Code Sections 3511, 4700, and 5050. Significant impacts are defined as: a) direct mortality; b) permanent or temporary loss of occupied habitat that would result in mortality to or reduced productivity of at least one individual of the species; c) avoidance of biologically important habitat for substantial periods resulting in mortality to or reduced productivity of at least one individual of the species.

Section 2081 of the Fish and Game Code allows "take" of a species listed under the CESA. Take is defined as any act that involves direct mortality or other actions that may result in adverse impacts when attempting to take individuals of a listed species. Under Section 2081, CDFG may issue a permit to authorize take for scientific, educational or management purposes, or take that is incidental to otherwise lawful activities.

California Fish and Game Code Native Plant Protection Policy

The goal of the California Native Plant Protection Policy (Policy) is to preserve, protect, and enhance endangered or rare plants of the state (Section 1900). Native plants are defined as plants that grow in a wild uncultivated state and which are normally found native to the plant life of the state (Section 1901). The California Fish and Game Commission may adopt regulations governing the

taking, possession, propagation, transportation, exportation, importation, or sale of any endangered or rare native plants.

All state departments and agencies shall, in consultation with CDFG, use their authority in furtherance of the purposes of this chapter by carrying out programs for the conservation of endangered or rare native plants. Such programs include, but are not limited to, the identification, delineation, and protection of habitat critical to the continued survival of endangered or rare native plants (Section 1911).

California Fish and Game Code Section 1600

As described in Section 3.15.2.1, actions that have the potential to alter a streambed or discharge materials into a stream must obtain a Streambed Alteration Agreement ("1602 permit") with the CDFG in accordance with Section 1600 of the California Fish and Game Code. The Streambed Alteration Agreement establishes time periods for construction and other conditions designed to protect streambed habitat areas, maintain flows, and minimize harm to wildlife.

3.15.3.2 AFFECTED ENVIRONMENT

The USFWS and NOAA Fisheries were contacted for their listings of threatened, endangered, and candidate species that may occur in the project vicinity. Copies of the letter and listings received from each of these agencies are included in Appendix E. Studies and field surveys were performed for all special-status species with potential to be present within the proposed Highway 101 project vicinity. Survey results for plants, wildlife and jurisdictional features are addressed in the NES and BAs in detail. The discussion below focuses on the results of studies conducted for five special-status plant species; three fish species, the Russian River tule perch, coho salmon, and steelhead; two special-status amphibian species, the California Tiger Salamander (CTS) and California red-legged frog; two special-status reptile species, the western and northwestern pond turtle; and two special-status bird species, the white-tailed kite and loggerhead shrike, for which there is potentially suitable habitat in the project area.

Special-status Plant Species

Three special-status plant species were identified in the USFWS listing as having potential to occur in the project area: Marsh microseris (*Microseris paludosa),* Sebastopol meadowfoam (*Limnanthes vinculans*), and North coast semaphore grass (*Pleuropogon hooverianus*), as described below. Preliminary botanical surveys resulted in negative findings for all three plants, and it is unlikely that these species exist within the project area. Protocol-level presence/absence surveys are ongoing.

Sebastopol meadowfoam is one of four federally-listed plants that occur in vernal pools and are subject to special habitat assessment requirements pursuant to the USACE HQE process for projects within the Santa Rosa Plain. The meadowfoam also occurs in mesic meadows and seeps, moist valley foothills and grasslands and thus is some what more widespread than the other listed species. The other three Santa Rosa Plain listed plants, Sonoma sunshine (*Blennosperma bakeri*), Burke's goldfields (*Lasthenia burkei*) and many-flowered navarretia (*Navarretia leucocephala* ssp. *Plieantha),* occur only in vernal pools. Burke's goldfields and Sonoma sunshine, in addition to the

Sebastopol meadowfoam, have been identified as federally-listed plants that are known to occur within the USGS Cotati Quad. Presence/absence botanical surveys for the four vernal pool plant species are ongoing to complete the USACE HQE process. Final survey results and results of any consultations with the USACE and USFWS will be reported in the final environmental document.

Marsh Microseris: Marsh microseris is a perennial herb in the sunflower family (*Asteraceae*) with pinnately lobed leaves. The plant produces five or more yellow, rayed flowers that bloom between April and June. Marsh microseris habitat consists of closed-cone conifer forests, cismontane woodlands, and valley and foothill grasslands in several California counties, including Sonoma County. Historically, the marsh microseris occurred in eight California counties. The species is thought extirpated from two of those counties completely as well as extirpated from occurrences in other counties, and the CNPS lists it as a 1B rare species.

Sepastopol Meadowfoam: Sebastopol meadowfoam is a small, multi-stemmed annual herb found in the false mermaid family (*Limnanthaceae*). Leaves on the mature plant have three to five undivided narrow leaflets. Small, bell-shaped white flowers bloom in April and May. Sebastopol meadowfoam is associated with mesic meadows and seeps, moist valley foothills and grasslands, and vernal pools in Sonoma County. Historically, the species was known in Sonoma and Napa counties, however, the Napa County population is thought extirpated. Most current occurrences of the species are found in the drainage of the Laguna de Santa Rosa on private land.

Sebastopol meadowfoam was listed by the state of California as endangered in 1979 and by the federal government in 1991. There is no critical habitat designated for the species and a vernal pool ecosystem recovery plan, which would include the species, is under development. Primary threats to Sebastopol meadowfoam are residential and commercial development, changes in hydrology, cattle grazing, and off road vehicle use.

North Coast Semaphore Grass: North coast semaphore grass is a large, succulent perennial in the grass family (*Poaceae*). The grass has long, flat ribbon-like leaves and a terminal unbranched spike or widely spaced spikelets. North Coast semaphore grass is found in broadleafed upland forest, North coast coniferous forest, and freshwater meadows and seeps. The species is known from approximately twelve populations in Marin, Sonoma, and Mendocino counties. Ten of these occurrences are thought extirpated, while two new populations have been found. North Coast semaphore grass was listed by the state of California as rare in 1979, and was upgraded in status to threatened in 2002. The main threats to North Coast semaphore grass are elimination of habitat and disruption of natural hydrology in the environment.

Special-status Wildlife Species

Russian River Tule Perch: The Russian River tule perch (*Hysterocarpus traski pomo*) is currently confined to the Russian River and its tributaries in Sonoma and Mendocino counties. Russian river tule perch require clear, flowing water and abundant cover. Although they will feed in shallow waters, they generally require deep pools for refuge and feeding. They are also very sensitive to stream pollution and tend to be absent from turbid, slow-moving water. The decline of Russian River

tule perch in recent years has been attributed primarily to habitat alteration due to dams on the Russian River that have increased turbidity and decreased water quality. The Russian River tule perch is currently listed as a species of concern by both the federal government and the CDFG.

Pacific Salmon and Trout: Steelhead and Coho Fisheries: Pacific salmonids and trout are anadromous fish. Anadromous is defined as those fish species that move from sea (saltwater) to fresh water for reproduction. The life cycle of anadromous salmonids entails hatching in cool headwater tributaries of large river systems and moving out to saltwater as young fish. In the ocean they grow rapidly to adults. Upon reaching maturity they return to hatching streams to spawn, typically followed by death.

Successful spawning, incubation, and juvenile rearing require clean, coarse, well-oxygenated gravels free of fine sediments. Excessive accumulations of sediment fines reduce the hatching success of eggs and retard embryo and juvenile growth. Upon emerging from gravel, juveniles (fry) remain in cool, shaded, clean water with resting and escape habitat and ample invertebrates available for food through late summer and fall. Spawning and juvenile rearing usually occurs along upper reaches of smaller tributaries with suitable habitat. As fry reach the smolt phase, they migrate downstream, typically March through June annually.

Each of the salmonid species has genetically distinct populations (runs), termed evolutionarily significant units (ESU) associated with each major tributary. The ESU serves as an alternative definition for "distinct population segments" under the federal Endangered Species Act (NOAA Fisheries 2002a). Due to differing life history strategies, management considerations and conservation threats, each ESU is treated as a separate species.

Two salmonid species consisting of two ESUs of salmonid fisheries have suitable habit in the Laguna de Santa Rosa and Copeland Creek within the project area: coho salmon *(Oncorhynchus kisutch)* - Central California Coast ESU; and steelhead *(Oncorhynchus mykiss)* - Central California Coast ESU, as described below.

Coho Salmon: The central California coast coho salmon is federally listed as threatened by the NOAA Fisheries and state listed as endangered by CDFG. Primary distribution of the coho salmon is the American and Sacramento rivers and other drainages northward from San Francisco Bay to Alaska. There are some minor coho runs documented for Santa Cruz County. Historically, coho salmon were never common in the Sacramento Valley or generally as far south as the Bay Area. Coho salmon have recently been recorded in tributaries of the Russian River. NOAA Fisheries has designated critical habitat for coho salmon in Copeland Creek and Laguna de Santa Rosa, including the water, streambed, banks, and adjacent riparian zone[6]. Nonetheless, based upon communication with NOAA Fisheries and CDFG[7], coho salmon are not known to occur in either of these streams.

[6] NOAA Fisheries, May 5, 1999. Designated Critical Habitat; Central California Coast and Southern Oregon/Northern California Coasts Coho Salmon. Federal Register, Vol. 64, No. 86: 24049-24062.
[7] Personal communication between Merritt Smith Consulting (Michael Fawcett), NOAA Fisheries (Dan Logan) and CDFG (Bill Cox).

Steelhead: The central California coast steelhead is federally listed as threatened by the NOAA Fisheries. Steelhead are migratory trout, saltwater-tolerant, and may include resident (non-migratory), potamodromous (migratory within drainage up to estuarine waters only), or anadromous (migrate to open ocean) life histories. Regardless whether resident or migratory, adults return to hatching sites to spawn after one to three years. Unlike other Pacific salmon species, adults do not necessarily die after spawning; up to 20 percent of adults live to repeat the breeding cycle three or four times.

Central California coast steelhead spawning runs begin in late October and continue through May, with peak migration from mid-December through mid-April. Eggs hatch in about two to three weeks. Hatching young may remain at the hatch site or disperse immediately, but generally remain in headwaters for about one year before moving out to salt water. Spawning and juvenile rearing usually occurs along upper reaches of smaller tributaries with suitable habitat. As fry reach the older juvenile phase, they migrate downstream, typically during March through June.

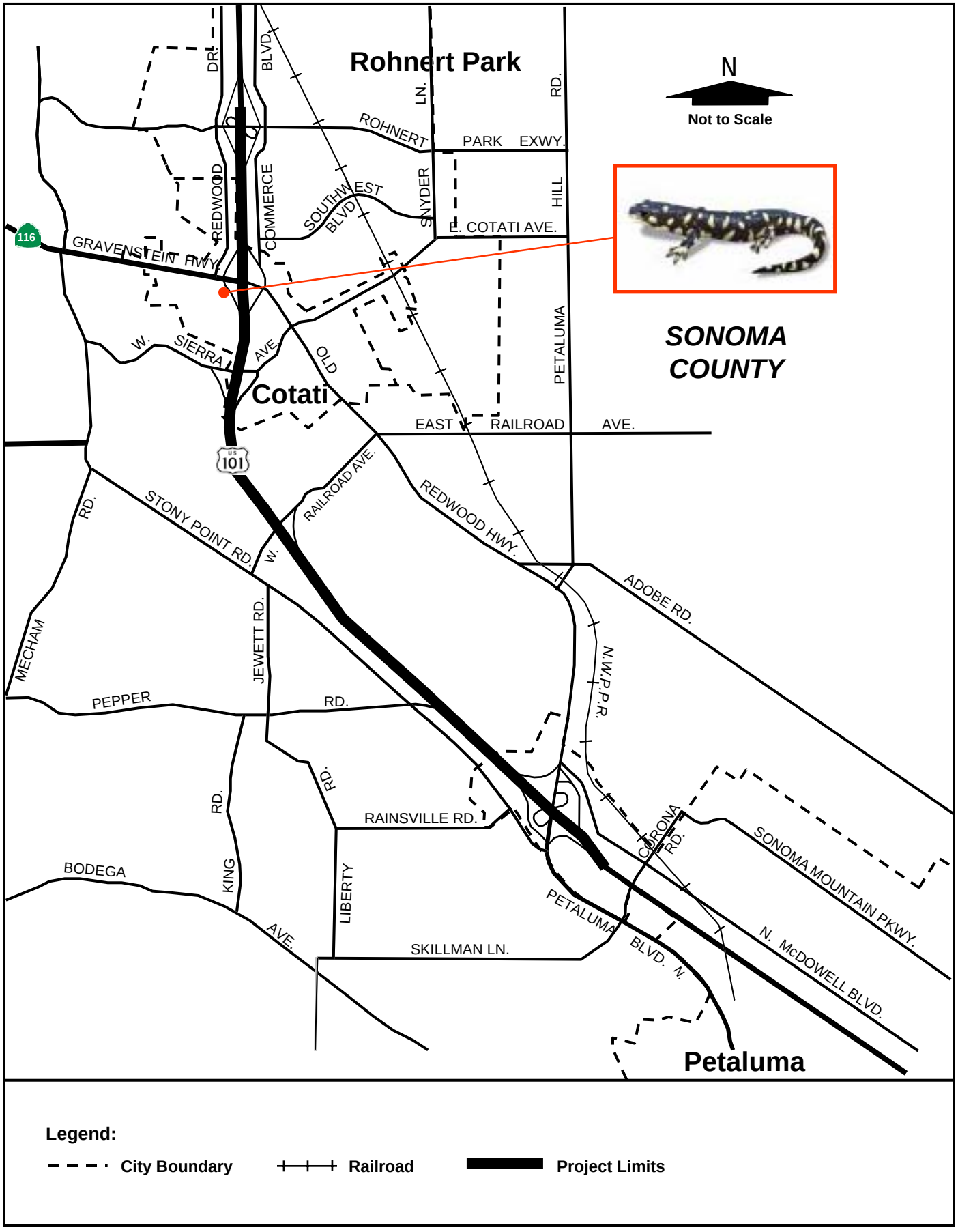
Steelhead are known to occur in Copeland Creek, which flows into the Laguna de Santa Rosa. The Petaluma Creek watershed, which includes Willow Brook in the project area, has been designated as critical habitat for steelhead.[8] Although steelhead are present in the Lagunas de Santa Rosa and its tributaries, the watershed has been excluded from designation as critical habitat.

California Tiger Salamander: The California Tiger Salamander (CTS, *Ambystoma californiense*) is federally listed as threatened in the Santa Barbara, Sonoma, and Central California Distinct Population Segment (DPS) and state-listed as a 'species of special concern'. A member of the family Ambystomatidae, the CTS is a large, terrestrial salamander with a broad, rounded snout. Coloration of the CTS varies, but in general, it is black above with large pale yellow to white spots along the sides. Adults reach a length of three to five inches. CTS are restricted to grasslands, oak savannah, and edges of mixed forest plant communities throughout their range. CTS use three distinct habitats during three different stages of their life cycle: breeding habitat, upland aestivation habitat, and movement or dispersal habitat.

Habitat assessment and protocol-level drift fence and pitfall trap surveys were conducted during 2003 to determine the presence of California Tiger Salamander (CTS).

There are approximately 167,159 m^2 (41 ac) adjacent to Highway 101 within the proposed right-of-way between the project limits that could potentially contain CTS, based solely upon the vegetation type. On the west side of the highway there are grassy uplands and adjacent pastures. There is no known CTS breeding habitat in the immediate project vicinity. A seasonal pond (dry at time of survey) and pasture occur south of West Railroad Avenue and west of the highway. This pond has not previously been documented as a CTS breeding location.

[8] NOAA Fisheries, September 2, 2005. Endangered and Threatened Species; Designation of Critical Habitat for Seven Evolutionary Significant Units of Pacific Salmon (*Oncorhyncus tshawytscha*) and Steelhead (*O. mykiss*) in California; Final Rule. Federal Register Vol. 70, No. 170: 52487-52627.



S C T A

Highway 101 HOV Lane Widening Project: Old Redwood Highway, Petaluma to Rohnert Park Expressway, Rohnert Park

CALIFORNIA TIGER SALAMANDER OCCURRENCE LOCATION
Figure 3.15-2

One CTS was detected in the grassy swale along the southbound on-ramp of the SR 116/Highway 101 interchange during the 2003 survey season, as shown in Figure 3.15-2. There are two historical CTS records within 0.50 mile of Highway 101 in this same general location. Consultations with the USFWS to identify impact areas and propose avoidance, minimization and compensation measures are ongoing.

California Red-legged Frog: The California red-legged frog (CRLF), (*Rana aurora draytonii)* is federally listed as threatened and state listed as a 'species of special concern'. The CRLF typically inhabits a variety of aquatic, upland, and riparian environments, including ephemeral and permanent ponds, seasonal wetlands, perennial creeks, intermittent streams, and manmade channelized drainages.

Two years of protocol-level surveys for CRLF were conducted in all potentially suitable habitat in the proposed project vicinity in accordance with the USFWS requirements as stated in "Guidance on Site Assessment and Field Surveys for California Red-legged Frogs" (1997).[9] These surveys identified no CRLF during either of the two survey seasons. The two years of negative survey findings, lack of known occurrences of CRLF within the Highway 101 corridor vicinity, and poor quality of potential habitat within the corridor support the conclusion that CRLF is not present within the highway corridor and would not be affected by construction of the proposed project.

Western and Northwestern Pond Turtle: The western pond turtle is identified as a species of special concern by CDFG. Under CEQA guidelines, the species must be considered in project planning regardless of formal listing as endangered or threatened.

The western pond turtle (*Clemmys marmorata*) historically occurred along the Pacific coast, principally west of the Cascade-Sierra Nevada-Pennisula Mountains, with the Central Valley hosting the highest densities. Decline of this species is attributed to conversion of native wetlands to urban and agricultural uses. Preferred habitat includes ponds, lakes or sloughs isolated from streamflow, but may include perennial streams and associated riparian habitats. A recent survey indicates that less than 15 percent of canal, stream, or river sites had western pond turtles, and less than 25 percent of all suitable, potential habitat contains pond turtles.

The northwestern pond turtle (*Clemmys marmorata marmorata*) is a subspecies of the western pond turtle that ranges from the Oregon-Washington border to central California, where it intergrades with the southwestern pond turtle (*Clemmys marmorata pallida*). Northwestern pond turtles inhabit a range of aquatic habitats with abundant logs, rocks, submerged vegetation, mud, undercut banks, and ledges. Due primarily to loss of aquatic habitat, this subspecies has declined through 75 to 80 percent of its historic range and is classified as a species of concern by both the USFWS and CDFG.

[9] USFWS recently released a *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog* (Aug 2005), which changed the survey period and specifics of the survey protocol. This guidance was released after the field work was completed for the present project.

The nearest recorded occurrence of western pond turtle or its subspecies, the northwestern pond turtle, was in 1994 immediately north of the project area in Hinebaugh Creek at the Rohnert Park Expressway interchange. No suitable habitat occurs within the project vicinity, however, suitable habitat occurs outside the project vicinity, along the Laguna de Santa Rosa, downstream of Highway 101. It is unlikely that western or northwestern pond turtle are present in the project vicinity.

White-tailed Kite: The white-tailed kite (*Elanus leucurus*) was threatened with extinction in the early part of the twentieth century but has since recovered and is now found in virtually all California lowlands west of the Sierra Nevada. Although California currently holds the largest population of white-tailed kites in North America, the species is still considered rare and is listed as a federal species of concern during breeding season and afforded fully protected status by the CDFG.

White-tailed kites are most often found in areas surrounded by open habitat such as lowland grasslands, agriculture, wetlands, oak-woodland and savannah habitats, and riparian areas. White-tailed kites breed and winter in low densities throughout central and into northern California. The CNDDB has a record of one breeding pair approximately 18.5 km (11.1 m) northwest of the project limits, however, nesting and foraging habitat occurs along the Highway 101 corridor in several locations.

Loggerhead Shrike: The loggerhead shrike (*Lanius ludovicianus*) is a predatory songbird that is resident in the project area. It is identified as a species of concern for USFWS and a species of special concern by CDFG and is protected under the Migratory Bird Treaty Act. Under CEQA guidelines, rare species must be considered in project planning regardless of formal listing as endangered or threatened. The loggerhead shrike qualifies as it is considered rare, restricted in distribution, or declining throughout its California range according to CDFG.

Loggerhead shrikes prefer open habitat characterized by forbs and grasses interspersed with low shrubs, widely-spaced trees, and bare ground. Prairies, grasslands, pastures, fencerows or shelterbelts, mowed road rights-of-way, abandoned railroad rights-of-way, cemeteries, golf courses, open woodlands, farmsteads, and old orchards are examples of the types of habitats where loggerhead shrikes most commonly occur. Scattered shrubs or trees, particularly dense, thorny species, are typically used for nesting and hunting perches. As opportunistic predators, loggerhead shrikes feed on a wide variety of prey, including insects, small mammals and birds, reptiles, amphibians, and occasionally carrion.

Loggerhead shrikes are adaptable to urban environments and may occur anywhere along the Highway 101 corridor as long as preferred habitat characteristics and abundant prey supplies are present.

3.15.3.3 ENVIRONMENTAL CONSEQUENCES

The No-Build Alternative would not result in new highway construction that would involve impacts to special-status plant and wildlife species. Impacts of the proposed project Build Alternative on special-status species are reported in the following paragraphs.

Special-status Plant Species

Protocol-level presence/absence surveys for vernal pool plant species are ongoing to complete the HQE process as required pursuant to San Francisco USACE final regional conditions affecting Nationwide Permits for projects within the Santa Rosa Plain. Preliminary investigations suggest that it is highly unlikely that vernal pool plant species exist within the immediate project area. If ongoing surveys find otherwise, avoidance and mitigation measures will be developed in accordance with the Santa Rosa Plain Conservation Strategy. Protocol-level presence/absence surveys for other special-status plant species are also ongoing. All study results will be reviewed in consultation with the USACE, USFWS, and CDFG. To ensure no take of such plant species, additional plant surveys are also recommended prior to construction during the bloom period for each of the plant species, as described in Section 3.15.3.4, Avoidance, Minimization and/or Mitigation Measures.

Special-status Wildlife Species

Russian River Tule Perch: The proposed project would permanently affect up to 0.0123 ha (0.0303 ac) of aquatic habitat at the Laguna de Santa Rosa that provides suitable habitat for Russian River tule perch.

Pacific Salmon and Trout: Coho Salmon and Steelhead: The proposed project would permanently affect up to 0.0199 ha (0.0499 ac) of aquatic habitat at the Laguna de Santa Rosa and Copeland Creek that provides suitable habitat for coho salmon and steelhead. The habitat at the Laguna de Santa Rosa is the same habitat that would be suitable for Russian River tule perch as reported in the previous paragraph. The proposed roadway improvements could impact these sensitive species by direct take; destruction of reproduction or seasonal habitat; increased run-off of sediments that could degrade bottom habitat and water quality; and construction of barriers to fish movement.

Formal consultation will be initiated with NOAA Fisheries regarding potential impacts to designated critical habitat for coho salmon and steelhead. NOAA Fisheries will review the NES and BA and is expected to return its no-jeopardy Biological Opinion identifying project conditions and measures to minimize harm to Pacific salmonid species. The NOAA Fisheries no-jeopardy Biological Opinion is anticipated before the environmental document for this project would be approved. The CDFG will review the NES and BA and determine if the NOAA Fisheries' biological opinion and conditions and measures to minimize harm to the species are consistent with the California Fish and Game Code, as coho is state listed as a threatened species in the region of the proposed project. Also, the Russian River tule perch is a state species of concern. It is expected that CDFG's consistency determination will be received before the final environmental document would be approved.

California Tiger Salamander: Consultation with the USFWS to determine project related impacts to CTS habitat and compensatory mitigation in accordance with the Santa Rosa Plain Conservation Strategy is ongoing. Although the project has been designed to avoid impacts to natural areas insofar as feasible and avoidance measures would be implemented during construction, complete avoidance of areas with potential to contain CTS is not possible and there is potential for "take" of CTS. The project is likely to affect but would not adversely affect the CTS.

Formal consultation with the USFWS was initiated on October 25, 2004 regarding impacts of the proposed project on California tiger salamander. The USFWS will review the NES/BA and is expected to return its no-jeopardy Biological Opinion identifying project conditions and measures to minimize harm to the species. The USFWS no-jeopardy Biological Opinion is anticipated before the environmental document for this project would be approved. The CDFG will review the NES/BA and determine if the USFWS biological opinion and conditions and measures to minimize harm to the species are consistent with the California Fish and Game Code. It is also expected that CDFG's consistency determination will be received before the final environmental document would be approved.

California Red-legged Frog: Negative protocol-level survey findings, lack of known occurrences of CRLF within the proposed project vicinity, and poor quality of potential habitat within the corridor support the conclusion that CRLF is not present within the highway corridor and therefore would not be affected by construction of the proposed project.

Western and Northwestern Pond Turtle: The nearest recorded occurrence of western pond turtle or its subspecies the northwestern pond turtle was in 1994 immediately north of the project area in Hinebaugh Creek at the Rohnert Park Expressway interchange. No suitable habitat occurs within the project vicinity, however, suitable habitat occurs upstream and downstream of Highway 101, along Willow Brook, Laguna de Santa Rosa, and Copeland creeks. Direct impact to the species could occur if individual pond turtle(s) moved into the project vicinity during construction. Indirect impacts to the species could be caused by siltation downstream of project construction. Preconstruction mitigation measures and best management practices will be implemented as described in Section 3.16.13 to ensure no take of individuals of the species.

White-tailed Kite, Loggerhead Shrike, and Migratory Birds: White-tailed kites are most often found in areas surrounded by open habitat such as lowland grasslands, agriculture, wetlands, oak-woodland and savannah habitats, and riparian areas. The California Natural Diversity Data Base (CNDDB) has a record of one breeding pair approximately 18.5 km northwest of the project limits, however, nesting and foraging habitat occurs along the Highway 101 corridor in several locations. Loggerhead shrikes and other migratory birds are adaptable to urban environments and may occur anywhere along the project corridor as long as preferred habitat characteristics and abundant prey supplies are present. Project construction and the conversion of previously undeveloped areas would cause the loss of potential habitat for white-tailed kite and loggerhead shrike as well as more common migratory birds that are protected by the Migratory Bird Treaty Act (MBTA). There is abundant alternative foraging and nesting habitat in the general area. Preconstruction mitigation measures will

be implemented as described in Section 3.16.13 to ensure no take of individual nests, eggs, or young of the species.

3.15.3.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

The following avoidance, minimization, and mitigation measures are proposed to address the special-status species impacts identified in the foregoing section. The final measures will be subject to concurrence by the USFWS and the CDFG.

Special-status Plant Species

The project has been designed to use existing right-of-way to the greatest extent feasible, thus avoiding impacts to natural habitats in the project area that provide potential habitat for special-status plants. Retaining walls and side slopes steeper than standard have been incorporated at several locations to minimize right-of-way takes and impacts to natural communities that provide habitat for special-status plant species. Preliminary investigations indicate that the majority of the project is located in degraded, ruderal habitat that contains no vernal pool or other special-status plant species. Protocol-level surveys for listed vernal pool plant species are ongoing to complete the USACE HQE process for projects within the Santa Rosa Plain. Pre-construction surveys are also recommended during the bloom period for special-status plants. In the unlikely event special-status plant species are found, mitigation will be discussed with the USFWS and CDFG and specific avoidance, minimization and/or mitigation measures will be established in accordance with the Santa Rosa Plain Conservation Strategy. Types of mitigation may include marking and protecting plants with orange safety fencing until seed-set later in the flowering season and/or collecting, storing, and growing seeds in a regional preserve or center for plant conservation following California Native Plant Society (CNPS) and CDFG plant protection guidelines.

Special-Status Wildlife Species

The project has been designed to use existing right-of-way to the greatest extent feasible, thus avoiding impacts to natural habitats in the project area that provide habitat for special-status wildlife species. Potential for presence and impacts to special-status wildlife species is limited primarily to three fish species and the California tiger salamander. Construction phase avoidance, minimization and/or mitigation measures are also described in Section 3.16.13.2 for special-status wildlife species that may enter project drainages.

Russian River Tule Perch and Pacific Salmon and Trout: Coho Salmon and Steelhead: Modifications at the Laguna de Santa Rosa and Copeland Creek crossings would be developed in consultation with NOAA Fisheries, and protective measures would be implemented to minimize incidental take of the species and to avoid jeopardizing the continued existence of the species. Revegetation, including erosion control, seeding and planting, will occur to maintain water clarity and nutrients. Revegetation of the creek and surrounding riparian areas will increase cover for Russian River tule perch, coho salmon, and steelhead, prevent erosion in streams, and provide a source of nutrients for the fish. Modifications and revegetation at the Laguna de Santa Rosa and Copeland Creek would be consistent with the CDFG's *California Salmonid Stream Habitat Restoration*

Manual. Riparian habitat will be restored at a mitigation ratio to be established in consultation with NOAA Fisheries, USFWS and CDFG.

California Tiger Salamander: Consultation with the USFWS to determine appropriate compensation measures for impacts to CTS areas in accordance with the Santa Rosa Plain Conservation Strategy is ongoing. Replacement that would most benefit the species would involve purchase of sufficient property rights for habitat conservation to ensure preservation in perpetuity. This approach presumes the identification of suitable land located sufficiently within the Highway 101 corridor to address project impacts, but sufficiently far from the threat of future roadway or urban development to ensure preservation. A multi-agency cooperative endeavor including FHWA, Caltrans, SCTA and a local public agency such as the Sonoma County Agricultural Preservation and Open Space District that would assume responsibility for maintenance of the habitat conservation easement appears the most promising, subject to consultation with the USFWS and CDFG. Alternatively, SCTA will purchase mitigation credits at a USFWS/CDFG-approved habitat mitigation bank. Final selection of compensatory measures for the CTS will be determined through coordination with the USFWS during the formal Section 7 consultation process.

3.15.4 Trees and Other Mature Vegetation

3.15.4.1 Regulatory Setting

California State Senate Concurrent Resolution No. 17

California State Senate Concurrent Resolution No. 17 was filed with the Secretary of State on September 1, 1989. This resolution addresses the protection of native Valley/Coast live oak woodlands with respect to land use/transportation planning projects. The resolution specifically calls for State agencies to "preserve and protect native oak woodlands to the maximum extent feasible," or "provide for replacement plantings where designated oak species are removed from oak woodlands."

California State Senate Bill 1334

California State Senate Bill 1334 was filed with the Secretary of State on September 24, 2004. The bill outlines oak woodland mitigation options for counties to achieve feasible and proportional habitat mitigation under CEQA. If a county determines that a project within its jurisdiction may result in a significant effect to oak woodlands, the county shall require one or more mitigation alternatives as outlined in the bill to mitigate the effect of the conversion of oak woodlands.

Sonoma County Tree Protection Ordinances

The following Sonoma County ordinances apply to trees in County jurisdiction:

- The Sonoma County Tree Protection Ordinance No. 4044 establishes general provisions and construction standards to ensure that projects shall be designed to minimize the destruction of protected trees. Protected trees (greater than nine inches), their protected perimeters and whether they are to be retained or removed are to be clearly shown on all improvement plans. Applicants are required to comply with the conditions established in the Ordinance and are encouraged to use

a qualified specialist to establish tree protection methods. The Ordinance also states that the Valley Oak (*Quercus lobata*) shall receive special consideration in the design review process to the extent that mature specimens shall be retained to the fullest extent feasible.

- The Sonoma County Valley Oak Ordinance No. 4991 defines Valley Oak sizes and mitigation options for removal of valley oaks. A written notice must be filed at least five days prior to removal.
- The Sonoma County Heritage Tree Ordinance No. 3651 provides for the identification and protection of designated heritage trees. The Ordinance requires approval and mitigation for removal of designated heritage trees.

3.15.4.2 AFFECTED ENVIRONMENT

Trees and other mature vegetation border the edge of Highway 101 at various locations throughout the project corridor. Mature trees in the corridor consist primarily of redwoods, with some Monterey Pines, eucalyptus, and oak trees. Consistent with the regulatory setting above, this section focuses on oak trees in the project vicinity. Existing redwood trees along Highway 101 are considered aesthetic resources because they are outside of their biological range, do not provide habitat, do not support redwood populations, yet offer scenic amenity to the highway corridor. Therefore, redwood trees and other ornamental vegetation along the project corridor are discussed in Section 3.6, Visual/Aesthetics.

Existing trees within the project limits are grouped into two classifications:

- Mature trees, which have trunks greater than 25 cm (10 in) in diameter at breast height; and
- Trees of relatively small size, which have trunks from 10 cm to 25 cm (four to 10 in) in diameter at breast height.

3.15.4.3 ENVIRONMENTAL CONSEQUENCES

The No-Build Alternative would not result in construction that would affect trees in the Highway 101 corridor. The proposed project would require removal of 35 Valley oaks; only five of these trees are classified as mature. No Coast live oaks would be removed. Construction of the proposed project would not result in the conversion of oak woodlands.

3.15.4.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

The project has been designed to use existing right-of-way to the greatest extent feasible in order to reduce impacts to mature trees in the project area. The majority of the widening occurs in the median of the roadway. Retaining walls and side slopes steeper than standard would be constructed at several locations to minimize right-of-way and impacts to mature trees. Mature oak trees would be replaced within the project right-of-way or at a nearby location at a ratio to be determined in consultation with the CDFG. Caltrans and their contractors would comply with Federal, State and Sonoma County quarantine regulations related to Sudden Oak Death (SOD) and the disposal and transport of vegetation debris. Caltrans would comply with the conditions established in the Sonoma County Tree

Protection and Heritage Tree Ordinances prior to removal of any trees outside of the State right-of-way and within County jurisdiction.

3.15.5 Invasive Species

3.15.5.1 REGULATORY SETTING

On February 3, 1999, President Clinton signed Executive Order 13112, which directs the agencies of the executive branch of the federal government to work to prevent and control the introduction and spread of invasive species. Species that are likely to harm the environment, human health, or the economy are of particular concern. The executive order builds on the National Environmental Policy Act (NEPA) of 1969, the Federal Noxious Weed Act of 1974, and the Endangered Species Act of 1973 to prevent the introduction of invasive species; provide for their control; and take measures to minimize economic, ecological, and human health effects.

Invasive species, with respect to a particular ecosystem, are defined as any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to the ecosystem and is likely to cause economic or environmental harm or harm to human health.

Under the executive order, a federal agency cannot authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the U.S. or elsewhere unless all reasonable measures to minimize risk of harm have been analyzed and considered. Complying with the executive order means that federal-aid and Federal Lands Highway Program funds cannot be used for construction, revegetation, or landscaping that purposely includes the use of known invasive plant species.

The executive order established a National Invasive Species Council, and until an approved national list of invasive plants is defined by the council, "known invasive plants" are defined as those listed on the official noxious weed list of the state in which the activity occurs.

The following discussion complies with Executive Order 13112.

3.15.5.2 AFFECTED ENVIRONMENT

Highway 101 between Old Redwood Highway and Rohnert Park Expressway consists of a four-lane freeway. Adjacent land use is primarily rural and agricultural, with single- and multi-family residential, commercial and industrial uses near the city centers. Vegetation is mostly ruderal/disturbed, non-native grassland, ornamental landscape planted with coast redwood, and agricultural planted with grapes; there are few remaining natural areas. A variety of waterways traverse the corridor, some in excavated ditches or culverts and others in natural-bottom channels or their natural watercourse. Soils in the project corridor are varied and reflect development from volcanic and mixed basic alluvium, marine sands, andesite, and valley clays.

3.15.5.3 ENVIRONMENTAL CONSEQUENCES

The Highway 101 corridor provides opportunities for the movement of invasive species through the landscape. Invasive plant and animal species can move on vehicles and in the loads they carry. Weed seed can be inadvertently introduced into the corridor during construction on equipment and through the use of mulch, imported soil or gravel, or sod. Some invasive plant species might be deliberately or inadvertently planted in erosion control, landscape, or wildflower projects. The Highway 101 corridor is adjacent to a variety of private lands. Many of these adjacent lands have weed problems, and the highway and local roadway rights-of-way provide corridors along which these noxious and exotic weeds can spread. Implementation of avoidance and minimization efforts, as described below, would ensure that the proposed project would not contribute to the spread of invasive species.

3.15.5.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

To prevent or minimize any introduction or spread of invasive species in the project area, the following methods will be incorporated into the construction specifications:

- Using high pressure water blasting or steam cleaning methods, clean all earthmoving equipment of dirt, mud, and seed residue before initially entering the project area.
- Avoid any unnecessary disturbance of project areas known to be infested with noxious weeds.
- Minimize soil disturbance within right-of-way.
- If soil disturbance outside slope stake limits is necessary, keep disturbed area to a minimum, monitor and control disturbed areas and topsoil stockpiles for growth of weed species subject to control, and re-vegetate in accordance with the landscape plans or other project specifications when disturbance is no longer necessary.
- Control weeds with pre-emergent, selective and nonselective herbicides. Inspect and monitor erosion control and other disturbed soils throughout construction. Inspect and monitor landscaping/seeding during the vegetation re-establishment period.
- Include payment for equipment cleaning under bid item for mobilization.
- Construction contractor shall comply with Federal, State and Sonoma County quarantine regulations related to Sudden Oak Death (SOD) and the disposal and transport of vegetation debris.

To prevent or minimize any introduction or spread of invasive animal species in the project area, the construction specifications will require that the contractor adopt sanitation and exclusion methods for preventing spread of invasive species, such as the following:

- Restrict use of contaminated soils and fills,
- Require pest-free forage and mulch and weed-free sod,
- Wash construction equipment.

3.16 Construction Impacts

3.16.1 Construction Stages, Schedule, and Work Hours

To minimize disruption to the traveling public, it is anticipated that the Highway 101 HOV Lane Widening Project would be constructed in stages. The following paragraphs present a feasible and reasonable construction staging for the purposes of identifying construction phase impacts and appropriate mitigation measures. Specific construction staging requirements would be defined during the final design process and an actual construction staging plan would be developed by the contractor. It is anticipated that this project would take approximately two years to construct. The construction contract would be followed by a replacement planting contract that would require approximately six months to complete and would include a three-year plant establishment period.

Each construction stage would maintain two lanes of traffic in each direction on Highway 101. Bicycle and pedestrian access would generally be maintained throughout the construction period, except during critical construction operations requiring short-term closures for certain elements or for safety reasons.

Lane closures would be made only during non-peak travel periods. All closures would require advance approval by the Resident Engineer and would be allowed only during periods of low traffic. Such periods would be defined through traffic studies made during the design phase in support of the construction project.

Most of the work could be done during daylight hours, but some nighttime work would be necessary to permit temporary closures for tasks that could interfere with mainline traffic or create safety hazards. Examples of these tasks include placing and removing temporary construction barriers, erecting structure falsework over the mainline or an active cross street, demolishing existing structures, placing pre-cast bridge segments, or connecting or conforming ramps to the mainline or local streets.

A Transportation Management Plan (TMP) would be developed in conjunction with the local jurisdictions. The TMP would provide advance notice to motorists and transportation and emergency service providers of information on construction activities and durations, detours, and access issues during each stage of construction. The TMP would identify services to facilitate safe implementation, such as increased California Highway Patrol presence during critical construction operations, and increased Freeway Service Patrol during peak travel periods. It would also include a public information program to provide motorists with advance notice of information related to the construction activities and durations, temporary closures and detours.

Temporary nighttime lane closures and/or detours would be required for activities such as placing and removing temporary concrete barriers to separate construction work areas and traffic. Some short-term closures (closures of a few hours to a few days) of existing interchange ramps may be necessary

during some construction activities such as constructing conforms between existing and new roadways, paving operations, and lane striping. Advance notice would be provided of ramp closures and traffic would be detoured to the adjacent interchanges for these periods. To maintain traffic on Highway 101 and local streets, construction activities requiring traffic lane or ramp closures would not be permitted at adjacent interchanges of Highway 101 at the same time.

Retaining walls would be constructed with the associated widening work in each stage and sound walls would be constructed as early in each stage as practicable to help mitigate construction noise. At some locations, sound walls would be located on top of retaining walls and could not be constructed until the retaining wall was in place.

The Highway 101/SR 116 Interchange−Option B, which would raise the mainline profile and reconstruct the interchange and structures, would require the most complex staging on the project. The interchange construction staging would be integrated with the mainline construction staging scenario, but would require additional steps to maintain ramp access during construction. The following table describes a possible construction sequence of the key construction elements at the Highway 101/SR 116 Interchange – Option B.

Table 3.16-1: Possible Construction Staging and Traffic Handling for the Highway 101/SR 116 Interchange–Option B

Construction Activity Sequence	Traffic Handling
• Construct relocated portion of Redwood Drive and Commerce Boulevard. • Construct southbound auxiliary lane, shoulders, right lane of southbound off-ramp, and retaining wall and concrete barrier between Redwood Drive and mainline. • Construct northbound off-ramp, and southbound on-ramp. Provide temporary connections to existing mainline. • Construct SR 116 and Old Redwood Highway improvements.	• Maintain traffic on existing Redwood Drive and Commerce Boulevard. Lane closures, detours or one-way traffic control may be required on Redwood Drive and Commerce Boulevard • Maintain traffic on existing ramps. Short term ramp closures and detours required to conform to existing roadways. • Maintain traffic on existing SR 116 and Old Redwood Highway with detours and lane closures.
• Construct median portion of new bridge and mainline.	• Night time lane closures on mainline required to set up temporary barriers to separate traffic and construction areas.
• Demolish existing southbound bridge. • Construct southbound outside portion of structure, mainline between southbound ramps, and left lanes of southbound off-ramp.	• Shift southbound mainline traffic to median. Use reduced lane widths during new structure construction in median. Maintain northbound mainline traffic on existing lanes. • Open southbound off-ramp to traffic.
• Demolish existing northbound bridge. • Construct northbound outside portion of structure and mainline between northbound ramps. • Construct realigned northbound on-ramp.	• Move temporary barrier to separate directional traffic and then shift northbound traffic to median lanes used by southbound traffic in previous stage. • Maintain traffic on existing ramp. Short term temporary ramp closure and detours required. • Shift northbound traffic to new mainline roadway.
• Construct median barrier.	• All Highway 101 mainline lanes and ramps constructed and open to traffic.

3.16.2 Traffic and Transportation/Pedestrian and Bicycle Facilities

3.16.2.1 Environmental Consequences

This subsection discusses anticipated construction phase effects on traffic, pedestrian, and bicycle access. Section 3.16.1, Construction Stages, Schedule and Work Hours, discusses the conditions that might affect access during construction.

During the construction phase of the project, traffic in the vicinity of the Highway 101 interchanges or along the Highway 101 mainline in the project area could be disrupted by construction equipment and vehicles. Traffic on Highway 101 may also be affected by trucks hauling construction materials and debris. Each construction stage would maintain two lanes of traffic on Highway 101 in each direction and bicycle and pedestrian access would be maintained throughout the construction period, except during critical short-term construction operations requiring closure to perform construction or for safety reasons.

Some minor detours would be required on the ramps and connecting streets during such short-term closures. During construction of conforms of the ramps to the mainline, which would occur at night, traffic would be detoured to the adjacent interchanges. It is anticipated that temporary night closures of SR 116 (under Option B only) and temporary day time closures of West Railroad Avenue would be required for safety reasons during demolition of the existing structures, during girder removal or placement, and during placement and removal of falsework for new structures. Temporary nighttime closures are also anticipated on West Sierra Avenue for falsework placement and removal associated with the structure widening.

Construction activities for the project are not expected to have substantial impact on the availability of parking. Impacts to non-motorized traffic would be similar to those affecting motorized traffic. Bicycles and pedestrians are prohibited on the Highway 101 right-of-way, but all detours of roadways that permit these modes of travel would include provisions for maintaining pedestrian and bicycle access during construction. Ramps meeting ADA requirements would be installed in sidewalks at all crosswalks affected by the project.

3.16.2.2 Avoidance, Minimization and/or Mitigation Measures

Construction staging plans would be developed to minimize impacts to existing roadways. Contractors would be required to coordinate activities with commute schedules to minimize impacts to highway traffic in the corridor. Closure of one or more lanes for construction activities will be limited to late night and weekend hours when traffic is at a minimum.

The project TMP would include a public information program to provide motorists and transportation and emergency service providers with information related to construction activities and durations, temporary closures and detours. The SCTA would coordinate with Caltrans and the local

jurisdictions to provide the public with advance notice of any proposed traffic detours and their duration.

Construction crews would follow established safety practices, including using flaggers, to protect work crews in the construction zone. Provisions would be incorporated into the construction contracts to designate areas for construction worker parking and to avoid parking impacts to residential or business areas.

Construction haul routes would utilize Highway 101 during non-peak hours to the greatest extent practicable to avoid traffic impacts to residential or business areas.

3.16.3 Farmlands/Agricultural Lands

Construction activities for the project area would have temporary effects on two parcels of agricultural land within the project area. A temporary construction easement of approximately 0.11 ha (0.27 ac) would be required north of Willow Brook, along the west side of Highway 101. A 400-mm (15.75-in) PG&E gas line would be relocated within a 0.28-ha (0.68-ac) easement south of Pepper Road along the west side of Highway 101. No substantial adverse effects are anticipated, and therefore, no mitigation is necessary beyond Best Management Practices.

3.16.4 Community Impacts

Construction of the proposed project would involve temporary short-term street closures or detours in the vicinity of the project. These are expected to have little or no effect on the ability of community members to access public services and facilities in the area. The primary effect would be the need for emergency vehicles to observe any short-term road closures and temporary construction detours. A TMP would be developed by the construction contractor to address maintenance of traffic and emergency services delivery during construction. One element of the TMP would be to provide advance notice of and coordinate with emergency service providers regarding such short-term closures and detours. Construction-phase detours and road closures and the TMP are described in Section 3.16.2, Transportation and Traffic/Pedestrian and Bicycle Facilities.

A temporary construction easement of approximately 1,010 m^2 (10,872 ft^2) would be required during construction of noise walls between West Sierra Avenue and Gravenstein Highway, temporarily affecting residential properties along the east side of Highway 101. A temporary easement of 260 m^2 (2,800 ft^2) would also be required to accommodate construction of these noise walls at the Saint Joseph Catholic Church. During construction of noise walls at the south end of the Leisure Lake Mobile Home Park, a temporary easement of approximately 60m^2 (646 $ft.^2$) would be required. No substantial adverse effects are anticipated, and therefore no mitigation is necessary beyond Best Management Practices. As described in Section 3.16.6, Visual/Aesthetics, the construction contractor would be responsible to clear the work site of any trash or debris created by construction workers or activities and to maintain the site in an orderly manner. Dust control during construction is discussed

in Section 3.16.11, Air Quality. Noise control measures relating to the construction of the proposed project are discussed in Section 3.16.12, Noise.

3.16.5 Utilities/Service Systems

It is anticipated that utility relocation work would be performed in advance of the Highway 101 HOV lane widening work. In addition, some utilities may require protection in place during construction of the roadway improvements. Caltrans would coordinate with all utility providers during the preliminary engineering and design phases of the project so that effective design treatments and construction procedures are incorporated to avoid adverse impacts to existing utilities and traffic during construction. Nonetheless, the potential exists for construction activities to encounter unexpected utilities within the area of roadway improvements. In addition, utility relocations may require short-term, limited interruptions of service. No interference to existing utility services is anticipated during the realignment of the overhead power transmission lines because PG&E would put customer loads on alternate lines until the connections are re-established.

If unexpected underground utilities are encountered, the construction contractor would coordinate with the utility provider to develop plans to address the utility conflict, protect the utility if needed, and limit service interruptions. Any short-term, limited service interruptions of known utilities would be scheduled well in advance and appropriate notification provided to users.

Caltrans would also coordinate with emergency service providers, and through the public information program, to avoid emergency service delays by ensuring that all providers are aware (well in advance) of road closures or detours.

3.16.6 Visual/Aesthetics

All construction activities for the project would involve the use of a variety of construction equipment, stockpiling of soils and materials, and other visual signs of construction. While construction activity would be evident to corridor residents and employees/employers at businesses in the project area, these visual changes would be short-term. The construction contractor would be responsible to clear the work site of any trash or debris created by construction workers or activities and to maintain the site in an orderly manner. Avoidance and minimization measures to protect mature trees and other vegetation are listed below.

- In areas where maximum protection of vegetation is desirable, clearing and grubbing is to occur only within excavation and embankment slope limits.
- Existing vegetation outside of clearing and grubbing limits shall be protected from the contractor's operations, equipment and materials storage.
- Tree trimming by the contractor shall be limited to that required in order to provide a clear work area.
- High visibility protective fencing shall be placed around trees prior to the commencement of roadway construction.

- Existing trees to be removed shall be field marked by the Engineer and approved by the Engineer prior to removal.
- Wherever feasible, slope lines will be adjusted to avoid tree removal.

No substantial adverse impacts are anticipated, and therefore, no mitigation is necessary beyond Best Management Practices. Dust control during construction is discussed in Section 3.16.11, Air Quality.

3.16.7 Cultural Resources

3.16.7.1 ARCHAEOLOGICAL IMPACTS

As described in Section 3.7, Cultural Resources, a systematic and thorough program of subsurface investigation has been conducted in addition to secondary research to identify buried cultural resources. As a result of these efforts, it is not anticipated that construction activities would disturb buried cultural materials. In the unlikely event that buried cultural resources are inadvertently discovered during any ground-disturbing activities, Caltrans and FHWA would comply with 36 CFR 800.13 regarding late discoveries.

3.16.7.2 HISTORIC ARCHITECTURAL IMPACTS

No construction-phase adverse impacts to historic architectural resources are anticipated. There are no eligible historic resources in the project vicinity that could be affected by construction activities.

3.16.8 Hydrology and Floodplains

3.16.8.1 IMPACTS

The proposed project crosses Copeland Creek, Laguna de Santa Rosa, and Willow Brook. Construction associated with waterway crossings could cause temporary changes in water volume or flow and increased siltation, sedimentation, erosion, and water turbidity from bankside activities and construction access.

3.16.8.2 MITIGATION

A Stormwater Pollution Prevention Plan (SWPPP) would be prepared and implemented, in accordance with Section 402 of the federal Clean Water Act, as amended. One purpose of the SWPPP is to identify areas of concern related to construction within or close to major waterways. As part of the requirements for the SWPPP, best management practices (BMPs) would be identified to be used during construction to minimize the effect of construction activities on waterways. Recommended construction-period BMPs include:

- Scheduling construction during the non-rainy season.
- Monitoring the forecast for rainfall; adjusting the construction schedule to allow implementation of soil stabilization and sediment treatment controls before the onset of rain.
- For stream crossings, minimizing disturbance by selecting the narrowest crossing, avoiding steep and unstable banks or highly erodible soils, selecting equipment that reduces the amount of

pressure exerted on the ground (e.g. using wide or high flotation tires, dual tires, tracked machines, etc), and using overhead or aerial access for transporting equipment across streams whenever possible.

- Limiting temporary stream crossings to culverts or bridges if the stream crossing remains during the rainy season.
- For pumped diversion of in-stream flows, continuously monitoring pumps and incorporating a standby pump. Employing velocity dissipation at the outlet as necessary to control erosion.
- Sizing diversion channels and/or culverts to accommodate a minimum 10-year storm event if placed within the channel during the rainy season.
- Isolating work areas within the waterway from the flow using sheet piling, k-rails, rip rap berms, or other methods of isolation.
- Keeping equipment used in a waterway leak-free.
- Stabilizing waterway embankments where necessary using rock slope protection, netting, erosion control blankets, gravel bag berms, fiber rolls, etc.
- Protecting all drainage systems (culvert entrances, inlets, etc) from debris and sediment laden waters.
- If in-channel disturbance of fines (sand and silt sized particles) occurs, washing the fines (using water from a water truck or hydrant) back into the interstitial spaces of the existing gravel and cobbles.

3.16.9 Water Quality and Stormwater Run-off

3.16.9.1 IMPACTS

The proposed project will involve construction over streams and channels, including Copeland Creek, Laguna de Santa Rosa, and Willow Brook. Construction will involve demolition of structures, cut and fill earthwork, asphalt paving, lengthening of culverts, bridge construction, retaining wall construction, site clearing, and landscaping. Each of these construction activities can have deleterious effects on the surrounding watershed and streams if stormwater and non-stormwater pollution controls are not in place during the time of construction. Another construction-phase impact is the discharge of construction-related pollutants, including pollutants from stormwater and non-stormwater discharges.

3.16.9.2 MITIGATION

The contractor would prepare a SWPPP to identify construction-period BMPs to reduce water quality impacts. The SWPPP would emphasize: 1) standard temporary erosion control measures to reduce sedimentation and turbidity of surface run-off from disturbed areas, 2) personnel training, 3) scheduling and implementation of BMPs throughout the various construction phases and during various seasons, 4) identification of BMPs for non-stormwater discharge such as fuel spills, and 5) mitigation and monitoring throughout the construction period. The plan will be submitted to Caltrans and the Regional Water Quality Control Board.

During construction, erosion control procedures would be used such as the placement of mulch on all disturbed areas, fiber rolls along slopes, silt fences at the boundaries of the construction site,

stabilized construction entrances and exits equipped with tire washing capability, and check dams placed strategically to reduce flow velocity and to filter flows in defined drainage-ways. Due to the project's proximity to the Laguna Santa Rosa Creek, the only sediment impaired 303(d) listed body of water that crosses the alignment, a sampling analysis program for sediment will be implemented during construction to prevent sediment from flowing into this water body during construction activities.

Construction over and adjacent to waterways would include special construction BMPs to minimize the debris deposition into those waterways, as follows:

- Demolition and construction over and adjacent to waterways would be accomplished using non-shattering methods that would not scatter debris (for example, wrecking balls would not be acceptable).
- Platforms would be placed under/adjacent to bridges over waterways to collect debris.
- Watertight curbs or toe-boards on bridges over waterways would be provided to contain spills and prevent materials, tools, and debris from falling from the bridge.
- Materials adjacent to waterways would be secured to prevent discharges via wind.
- Attachments would be placed on construction equipment such as backhoes to catch debris from small demolition operations.
- Accumulated debris and waste from demolition would be stockpiled away from the waterway.
- Work areas within the waterway would be isolated from the flow using sheet piling, k-rails, rip rap berms, or other methods.
- Drip pans would be used during equipment operation, maintenance, cleaning, fueling and storage for spill prevention. Drip pans would be placed under all vehicles and equipment placed on bridges when expected to be idle for more than 1 hour.
- Equipment would be kept in a leak-free waterway.
- Waterway embankments would be stabilized, using rock slope protection, netting, erosion control blankets, gravel bag berms, fiber rolls, and other stabilization methods, as necessary.
- All drainage systems (such as culvert entrances and inlets) would be protected from debris and sediment laden waters.
- Logs of all storm and spill events would be kept.

3.16.10 Hazardous Wastes/Materials

3.16.10.1 IMPACTS

Two principal types of hazardous wastes or materials may cause impacts during construction: hazardous materials used during the construction process and hazardous wastes that may be generated during construction. Section 3.11, Hazardous Waste/Materials, discusses the potential for encountering pre-existing hazardous wastes within the project area and identifies appropriate mitigation measures.

Some hazardous materials, including fuels and motor oils, paints, cleaners, degreasers, and insulating materials, would be used during construction. While many of these materials are commonly used,

they are considered hazardous materials (fuels, for example, are flammable) based on their physical properties, and improper handling could endanger workers and the public or result in contamination of soil and/or water.

The degree of hazard associated with these impacts on human or environmental receptors would depend upon the chemical properties, concentrations, or volumes of contaminants; the nature and duration of construction activities; and contaminant migration pathways. The largest potential exposure risk is to the construction workers.

3.16.10.2 MITIGATION

An approved worker health and safety plan (WH&SP) would address any hazardous materials handling during construction activities pursuant to Title 8 of the California Code of Regulations regarding workers' safety and the use of protective equipment during excavation, moving, or handling of contaminated soil or water. The WH&SP would establish measures to avoid or minimize potential worker and public exposure to airborne contaminant migration by incorporating dust suppression techniques in construction procedures. The plan also would address avoidance and minimization of worker and environmental exposure to contaminant migration via surface water run-off pathways by implementation of comprehensive measures to control drainage from excavations. In addition, the WH&SP would address handling, storage, and disposal of any hazardous materials used in the construction process. Since construction workers are in the closest proximity to potential hazards, a plan that avoids impacts to construction workers would provide adequate protection for surrounding residents, workers, and the traveling public.

3.16.11 Air Quality

3.16.11.1 IMPACTS

The BAAQMD's approach to the analysis of construction impacts is to emphasize implementation of effective and comprehensive control measures rather than detailed quantification of emissions. PM_{10}, which is primarily emitted from earthmoving activities, is the pollutant of greatest concern with respect to construction activities. Under appropriate construction controls, there would be no adverse impacts from air pollutant emissions for construction activities.

Construction of the Build Alternative would consist of six phases over approximately two years, from 2009 to 2011: 1) clearing and grubbing; 2) earthwork; 3) construction of structures; 4) construction of retaining walls and sound walls; 5) paving; and 6) finishing. Pollutant emissions would be generated from the following construction activities:

1. Clearing and grubbing,
2. Grading and excavation,
3. Mobile emissions related to construction worker travel to and from project sites,
4. Mobile emissions related to the delivery and hauling of construction supplies and debris to and from project sites, and
5. Fuel combustion by on-site construction equipment.

The South Coast Air Quality Management District's (SCAQMD) construction emission calculation formulas were used to estimate construction emissions. Table 3.16.11-1, Construction Emissions, shows the estimated emissions associated with each phase of construction.

Table 3.16.11-1: Construction Emissions

Construction Phase	Pounds per Day				
	CO	ROG	NO_X	SO_X	PM_{10}
1. Clearing & Grubbing	28	8	98	16	64
2. Earthwork	33	9	110	19	88
3. Structures	46	11	134	24	55
4. Retaining Walls & Soundwalls	36	9	106	19	53
5. Paving	32	8	103	17	83
6. Finishing	18	5	67	11	18

Source: Terry A. Hayes Associates LLC, 2005.

3.16.11.2 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Control measures, such as the following, would be implemented to minimize construction emissions:

- All active construction areas shall be watered at least twice daily.
- All trucks hauling soil, sand, and other loose materials shall be covered and shall maintain at least two feet of freeboard.
- All unpaved access roads, parking areas, and staging areas at the construction site shall be watered at least three times daily or shall be applied with non-toxic soil stabilizers.
- All paved access roads, parking areas, and staging areas at the construction site shall be swept daily with water sweepers.
- Streets shall be swept daily with water sweepers if visible soil material is carried onto adjacent public streets.
- Non-toxic soil stabilizers shall be applied to inactive construction areas (previously graded areas that are inactive for ten days or more).
- Exposed stockpiles of dirt, sand, or debris shall be enclosed, covered, watered at least twice daily, or applied with non-toxic soil binders.
- Traffic speeds on unpaved roads shall be limited to 15 miles per hour.
- Sandbags or other erosion control measures shall be installed to prevent silt runoff to public roadways.
- Operations on any unpaved surfaces shall be suspended during "Spare the Air" days.
- Vegetation in disturbed areas shall be replanted as quickly as possible.
- Tires or tracks of all trucks and equipment leaving the site shall be washed.
- Excavation and grading activities shall be suspended when winds exceed 25 miles per hour.
- Diesel particulate filters and other suitable controls shall be used to reduce emissions of diesel particulate matter and other air pollutants.
- Visible emissions from all heavy duty off-road diesel equipment shall not exceed 20 percent opacity for more than three minutes in any hour of operation.

- Construction-related trips of workers and equipment, including trucks and heavy equipment, shall be minimized. An activity schedule shall be designed to minimize traffic congestion around the construction site.
- Construction equipment shall be model 1996 or newer. Fuel shall be low sulfur.
- Periodic, unscheduled inspections shall be employed to ensure that construction equipment is properly maintained at all times, tuned to manufacturer's specifications, and not modified to increase horsepower, except in accord with established specifications.
- A construction schedule shall be specified to minimize cumulative impacts from multiple development and construction projects in the area.
- Construction equipment and staging zones shall be located away from sensitive receptors such as children and the elderly, as well as away from fresh air intakes to buildings and air conditioners. Equipment idling shall be minimized.
- Construction equipment shall use cool exhaust gas recirculation.

Table 3.16.11-2 displays construction emissions for the proposed project with these mitigation measures. CO, ROG, NO_x, and PM_{10} emissions would be significantly reduced. SO_x emissions would remain unchanged. These mitigation measures would ensure that impacts are not substantially adverse during construction of the project.

Table 3.16.11-2: Construction Emissions With Mitigation

Construction Phase	Pounds per Day				
	CO	ROG	NO_X	SO_X	PM_{10}
Clearing & Grubbing	4	1	59	16	30
Earthwork	4	1	66	19	41
Structures	5	1	81	24	25
Retaining Walls & Soundwalls	4	1	63	19	25
Paving	4	1	62	17	39
Finishing	3	1	40	11	8

Source: Terry A. Hayes Associates LLC, 2005.

3.16.12 Noise

Noise at the construction sites would be intermittent and varying in intensity. The degree of construction noise may vary at different areas of the project site and also depending on the types of construction activities.

3.16.12.1 Regulatory Setting

During the construction period, contractors would be required to comply with the noise ordinances of the cities of Petaluma, Cotati, and Rohnert Park:

City of Petaluma – Noise produced from construction equipment shall not occur before 7:00 a.m. nor after 10:00 p.m. any day of the week. In addition, noise producing activities shall not begin before

9:00 a.m. on Saturdays, Sundays and recognized Holidays. An application can be filed with the City of Petaluma Planning Director's office to obtain a conditional permit for exemption during these hours. In addition to the hours and days of restriction, the maximum noise levels are not to exceed a limit that ranges from 60 to 80 dBA, depending on the cumulative duration of noise levels (Petaluma 1997).

City of Cotati – The City requires construction activities of any sort (other than those performed on a single parcel of land by its owner or tenant) to be performed between the hours of 7:00 a.m. and 7:00 p.m., Monday through Friday, and 9:00 a.m. to 6:00 p.m. Saturdays (Cotati 2004).

City of Rohnert Park – Construction projects that are within 500 feet of a residentially zoned property shall not produce noise that is annoying or discomforting to a reasonable person of normal sensitivity between 6:00 p.m. and 8:00 a.m. the next day, unless a permit has been obtained beforehand. In addition to the hours and days of restriction, the noise level at any residential property is not to exceed 60 dBA during daytime hours (7:00 a.m. and 7:00 p.m.) and is not to exceed 50 dBA or the measured ambient level during nighttime hours (7:00 p.m. and 7:00 a.m.) However, the City's regulations allow daytime noise to exceed the limits up to 65 dBA for a cumulative period of not more than five minutes during any one hour, and up to 70 dBA for a cumulative period of not more than one minute during any one hour (Rohnert Park 2004a and Rohnert Park 2004b).

3.16.12.2 IMPACTS

Long-duration construction noise exposures are difficult to quantify due to the intermittent nature of construction noise. Highway construction is accomplished in several different phases. Table 3.16.12-1 lists the calculated noise level for typical construction activities that could be expected in the project area.

3.16.12.3 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

The following control measures would be implemented to minimize noise disturbances at sensitive receptors during construction:

Equipment Noise Control

- Ensure that all equipment items have the manufacturers' recommended noise abatement measures, such as mufflers, engine enclosures, and engine vibration isolators intact and operational. All construction equipment would be inspected at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding, etc.) (Caltrans, 1999).
- Turn off idling equipment.

Table 3.16.12-1: Construction Operation Noise Levels

No. of Items	Equipment Type	Maximum Equipment Noise Level at 15 m, dBA	Hourly Equivalent Noise Levels at 15 m, dBA [1]	Hourly Equivalent Noise Levels at 30 m, dBA [1]
Clear and Grub				
1	Excavator	83	80	74
1	Backhoe	75	72	66
4	Heavy Duty Dump Trucks	77	74	68
		Overall $L_{eq}(h)$	84	78
Bridge Demolition				
1	Backhoe	75	72	66
1	Excavator	83	80	74
4	Heavy Duty Dump Trucks	82	79	73
		Overall $L_{eq}(h)$	87	81
Retaining Walls				
1	Backhoe	75	72	66
1	Bormag BMP 851	80	77	71
1	Concrete Pump	81	78	72
1	Compressor	68	65	59
3	Ready Mix Trucks	81	78	72
4	Medium Duty Dump Trucks	77	74	68
2	Flatbed Truck	75	72	66
		Overall $L_{eq}(h)$	87	81
Paving				
1	Grader	75	72	66
1	Water Truck	77	74	68
1	Vibratory Roller	78	75	69
1	Compactor	76	73	67
1	Concrete Pump	81	78	72
3	Ready Mix Trucks	81	78	72
1	Asphalt Paver	79	76	70
1	Asphalt Roller	78	75	69
1	Sweeper	79	76	70
4	Medium Duty Dump Trucks	77	74	68
2	Flatbed Truck	75	72	66
		Overall $L_{eq}(h)$	88	82
Earthwork				
1	Excavator	83	80	74
1	Backhoe	75	72	66
1	Front Loader	74	71	65
1	Dozer	85	82	76
1	Trencher	80	77	71
4	Heavy Duty Dump Trucks	77	74	68
		Overall $L_{eq}(h)$	87	81
Structures				
1	Excavator	83	80	74
1	Backhoe	75	72	66
1	Bormag BMP 851	80	77	71
1	Crane	85	82	76
1	Concrete Pump	81	78	72
1	Compressor	68	65	59
1	Bridge Deck Paver	77	74	68
2	Flatbed Truck	75	72	66
1	Pile Driver	80	77	71
4	Medium duty Dump Trucks	77	74	68
3	Ready Mix Trucks	81	78	72
		Overall $L_{eq}(h)$	89	83
Miscellaneous				
1	Loaders	74	71	65
1	Dozer	85	82	76
2	Medium duty Dump Trucks	77	74	68
		Overall $L_{eq}(h)$	84	78

Notes: Calculated construction noise levels assume that all equipment operates for six hours out of an eight-hour day. Calculations also assume that all equipment is operated at full load 70 % of the time.

1. Predicted noise levels are from the center of the construction activity.

Source: Parsons, 2005

Administrative Measures

- Implement a construction noise monitoring program to limit the impacts.
- Plan noisier operations during times of least sensitivity for receptors.
- Keep noise levels relatively uniform and avoid impulsive noises.
- Maintain good public relations with the community to minimize objections to unavoidable construction noise. Provide frequent activity updates of all construction activities.

Application of the mitigation measures will reduce construction noise at the sensitive receptors; however, a temporary increase in noise would likely occur.

3.16.13 Biological Resources

3.16.13.1 IMPACTS

This section focuses on the short-term, temporary impacts of constructing the Build Alternative on biological resources in the project vicinity. Permanent impacts and mitigation measures are addressed in Section 3.15, Biological Environment.

Natural Communities

Temporary effects on natural communities that would result from the Build Alternative are shown in Table 3.16.13-1, below.

Table 3.16.13-1: Temporary Impacts to Natural Communities for the Build Alternative (hectares/acres)

Affected Natural Communities	Area of Impact
Ruderal/Disturbed	26.3 ha/65.75 ac
Non-native Grassland	0.71 ha/1.75 ac
Seasonal/Freshwater Emergent Wetland/Open Water	0.13 ha/0.32 ac
Willow Riparian	0.04 ha/0.11 ac
Coyote Brush Scrub	0.21 ha/0.52 ac

Wetlands and Other Waters of the United States

The project has the potential to temporarily affect up to 0.120 ha (0.296 ac) of jurisdictional wetlands and 0.011 ha (0.026 ac) of other waters of the U.S.–or 0.131 ha (0.322 ac) total wetlands/waters. Avoidance and minimization measures are proposed in Section 3.16.13.2.

Threatened and Endangered Species

As described in Section 3.15, Biological Environment, suitable habitat for three special-status fish species, coho salmon, steelhead, and Russian River tule perch, occurs in the project at the Laguna de Santa Rosa and Copeland Creek. Avoidance and minimization measures, including best management practices (BMPs), are proposed to avoid incidental take of individuals, minimize impacts to their habitat, and prevent degradation of upstream waters (See Section 3.16.13.2, below).

Areas with potential to contain California Tiger Salamander (CTS) occur along Highway 101 within the project limits. Avoidance and minimization measures, including pre-construction surveys, are proposed to avoid incidental take of CTS and minimize impacts to CTS habitat (See Section 3.16.13.2, below). Habitat assessment and two years of negative findings protocol-level California red-legged frog (CRLF) surveys support the conclusion that CRLF are not present in the project vicinity. Avoidance and minimization measures are proposed, however, to prevent impact to CRLF that may enter drainages. No suitable habitat for western and northwestern pond turtles occurs within the project vicinity, however, suitable habitat occurs upstream and downstream of Highway 101, along Willow Brook, Laguna de Santa Rosa, and Copeland creeks. Biological monitoring for western and northwestern pond turtles during construction is recommended. If project activities cannot avoid the breeding bird season, preconstruction surveys are proposed for white-tailed kite and loggerhead shrike, as well as other migratory bird species.

No special-status plants were identified in the project vicinity during preliminary field studies, and it is not anticipated that special-status plants would occur in the project vicinity at the time of construction. Protocol-level presence/absence surveys for five special-status plant species for which potentially suitable habitat was identified are ongoing. Pre-construction surveys are also recommended for these plant species to ensure no harm to the species during construction.

3.16.13.2 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

Construction phase impacts would be avoided or minimized by using Caltrans standard specifications and BMPs that have been established for construction of State highway facilities (Caltrans 1995). Procedures are identified with respect to individual biological resource issues in the following paragraphs.

Natural Communities

Willow Riparian Scrub. Avoidance measures will be implemented to minimize construction-phase effects on willow riparian scrub. Measures would include identifying, marking, and protecting trees with protective orange fencing to avoid disturbance or accidental intrusion by workers or equipment.

Wetlands and Other Waters of the U.S.

The following avoidance measures would be included in the project specifications and special provisions:

- Construction within wetlands and drainages would be avoided during the rainy season to prevent excessive siltation and sedimentation;
- Materials and fluids generated by construction activities would be placed at least 30 meters (100 feet) from wetland areas or drainages until they could be disposed of in accordance with applicable regulations; and
- All natural communities and wetland areas located outside of the construction zone that could be affected by construction activities would be temporarily fenced off and designated as Environmentally Sensitive Areas (ESAs) to prevent accidental intrusion by workers and equipment.

Wetland habitats that are temporarily lost or disturbed due to project construction would be restored on-site to preconstruction conditions. Revegetation would be with native species such as cattails (*Typha* spp.), *Juncus* spp., or *Cyperus* spp. Any revegetation would be carried out by a contractor qualified in habitat restoration.

Special-Status Plant Species

Sonoma Sunshine, Marsh Microseris, Sebastopol Meadowform, North Coast Semaphore Grass, and Burke's Goldfields. Protocol-level presence/absence surveys for vernal pool and other special-status plant species are ongoing as described in Section 3.15.3.2 Affected Environment − Special-status Plant Species. Pre-construction surveys for special-status plant species are recommended during the bloom period prior to construction. In the unlikely event, special-status plant species are found, mitigation will be discussed with the USFWS and CDFG and specific mitigation measures identified as appropriate. Types of mitigation may include marking and protecting plants with high visibility fencing until seed-set later in the flowering season and/or collecting, storing, and growing seeds in a regional preserve or center for plant conservation following CNPS and CDFG plant protection guidelines.

Special-Status Wildlife Species

Pacific Salmon and Trout: Coho Salmon and Steelhead: The construction contractor shall adopt BMPs that NOAA Fisheries, USFWS, and CDFG believe would help avoid jeopardizing the continued existence of the species, including:

- Loss of vegetation and delivery of sediments to streams will be minimized through the creation of buffer zones where the project crosses through riparian areas. Construction activities, such as staging, stockpiling of materials or equipment, and equipment movement will be limited to locations outside of riparian areas, where possible. Riparian areas will be identified as ESAs and will be clearly marked with fencing.
- Construction and grading that would affect Copeland Creek, Laguna de Santa Rosa and drainages, or upland areas that might erode into the creek or drainages, would be restricted to the period from June 15 to October 15.
- A Storm Water Pollution Prevention Plan (SWPPP) will be implemented to minimize storm water and groundwater pollution caused by construction activities. The SWPPP will outline erosion control measures and other BMPs to control and prevent to the maximum extent practicable the discharge of pollutants to surface and water and groundwater.
- Laguna de Santa Rosa and Copeland Creek will be temporarily piped through the construction area between June 15 and October 15.
- All coho salmon and steelhead present in dewatered areas will be captured and transported to free flowing water by a NOAA Fisheries approved biologist.

Russian River Tule Perch: Avoidance and minimization measures, as described above for coho salmon and steelhead, would be sufficient to protect Russian River tule perch.

California Tiger Salamander. Avoidance and minimization efforts would be implemented to avoid construction-related impacts to CTS, as described below.

- Best management practices and procedures would be implemented during all phases of construction.
- Construction would be limited to the dry season (June 1st−October 15th) when drainages and wetlands would be either dry or at their lowest water level to eliminate the potential for take of breeding/migrating individuals. Vegetation clearing would be confined to the minimal area necessary to facilitate construction activities. CTS habitat that can be avoided during construction would be flagged and designated as ESA. These areas would be avoided by all construction personnel.
- Twenty-four hours prior to construction activities, the project areas would be surveyed for CTS. Survey of the project area would be repeated if a lapse in construction activity of two weeks or greater should occur. If a CTS is encountered during construction, all activities shall cease until appropriate corrective measures have been completed or it has been determined that the salamander will not be harmed.
- A Worker Environmental Awareness Program would be conducted to provide construction personnel with information on their responsibilities with regard to the federally listed CTS.
- The construction site would be monitored by a qualified biologist during all phases of construction to remove any CTS found in the construction area. If individual CTS are encountered, they would be moved immediately to a site that is a minimum of 100 m (330 ft) from the construction area boundary. The relocation site would be determined prior to commencement of construction activities.

California Red-legged Frog. To prevent impacts to California red-legged frogs that may enter project drainages, the following actions consistent with construction near surface waters shall be implemented:

- Wetland areas that cannot be avoided shall be drained between mid-August and late-September. Construction activities shall occur during October through November after draining the wetland or following a survey by a qualified biologist to confirm that tadpoles are not present. The conduct of construction activities outside this period shall be subject to review and approval by the USFWS.
- All fueling and maintenance of vehicles and other equipment shall occur at least 20 m (66 ft) from any riparian habitat or water body. SCTA shall ensure that contamination of habitat does not occur during such operations. Prior to the onset of work, the USFWS shall ensure that SCTA has prepared a spill prevention and action plan to allow a prompt and effective response to any accidental spills. All workers shall be informed of the importance of preventing spills and of the appropriate measures to take should a spill occur.
- During construction, native riparian and upland vegetation on the upper banks of wetlands and creeks shall remain in place to provide cover for red-legged frogs except in areas where the equipment would require access to the wetlands and creeks during sediment removal activities. To the extent feasible, sediment removal shall occur in the bottom of the creeks, below the high water mark.
- The size of staging areas and the total area of the activity shall be limited to the minimum necessary to achieve the project goal. Routes and boundaries shall be clearly marked.

- To control erosion during and after project implementation, the applicant shall implement BMPs as identified by the RWQCB.

Western and Northwestern Pond Turtle: Avoidance and minimization efforts, including preconstruction surveys, would be implemented to avoid construction-related impacts to western and northwestern pond turtle, as described below.

- BMPs would be implemented during all phases of construction.
- The construction contractor shall furnish a biologist qualified to survey for western and northwestern pond turtles.
- Twenty-four hours prior to construction activities, the project areas would be surveyed by the qualified biologist for western and northwestern pond turtle. Surveys of the project area would be repeated if a lapse in construction activity of two weeks or greater should occur.
- A Worker Environmental Awareness Program would be conducted to provide construction personnel with information on their responsibilities with regard to the western and northwestern pond turtle.
- A permitted biological monitor shall be on-call and capable of responding to the work site within one hour.
- If individual western or northwestern pond turtles are encountered, they would be moved immediately to a site that is a minimum of 100 m (330 ft) from the construction area boundary. The relocation site would be determined prior to commencement of construction activities.
- If western or northwestern pond turtles are encountered during construction, all activities shall cease until appropriate corrective measures have been completed or it has been determined that the species will not be harmed.

White-tailed Kite, Loggerhead Shrike and Other Migratory Birds.

- If project activities cannot avoid the bird breeding season (generally February 1 – August 31), focused pre-construction breeding surveys will be conducted for white-tailed kite and loggerhead shrike, as well as other species protected under the MBTA.
- Surveys shall be conducted in all areas that may provide suitable nesting habitat by a suitably qualified ornithologist to be furnished by the contractor.
- Surveys would include areas within 1,640 m (500 ft) of the construction area that provide potential nesting habitat (access permitting).
- No more than two weeks before construction, a survey for nesting would be conducted by a qualified ornithologist.
- If nesting birds are identified, occupied nests would not be disturbed during the nesting season (February 1 through August 31 for raptors; March 1 through August 31 for other species), including a minimum 820-m (250-ft) buffer zone around any occupied nest, 492 m (150 ft) for other non-special status passerine birds, and up to 1,640 m (500 ft) for raptors.
- Construction-related activities would not be allowed within the buffer zone until the young have fledged.
- For activities that occur outside the bird breeding season (generally September 1 through February 28), such surveys would not be required.

3.16.14 Construction Employment

Given the size of the Bay Area economy, neither the No-Build nor the Build alternatives would result in substantial changes to regional socioeconomics beyond current regional planned and forecasted growth. The Build Alternative would result in a temporary increase in construction related employment, as described below.

3.16.14.1 METHODOLOGY AND IMPACTS

Table 3.16.14-1 provides an estimate of the number of positions and level of economic activity created by the expenditure of construction funds for the No-Build and Build Alternatives. Estimates are based in part on an input/output study of construction activity in Texas by the Federal Highway Administration (Politano and Roadifer, 1989). Funds created in economic output include the multiplier effect of direct construction being re-spent in service or other sectors of the economy. Economic activity generated by the proposed project is anticipated to benefit the San Francisco Bay Area region and would also follow the labor and material markets for transportation-related construction.

Table 3.16.14-1: Impacts from Construction Investment in the Highway 101 HOV Lane Widening Project: Petaluma to Rohnert Park (millions of 2006 dollars)

Alternative	Construction Value *	Regional Economic Output	Total Earnings	Job Creation (Person Years of Employment)	
				On-Site	Total
Build Alternative – Option A	$140.9	$244.9	$64.9	800	1,600
Build Alternative – Option B	$153.8	$267.3	$70.8	800	1,700
No-Build Alternative	N/A	N/A	N/A	N/A	N/A

* Construction impacts are based on preliminary estimates for construction value, which exclude right-of-way costs and include design, construction management, and agency costs.

N/A = Not Applicable

A.L Politano and Carol J. Roadifer, Regional Economic Impact Model for Highway Systems, *Transportation Research Record 1229*, Transportation Research Board, Washington D.C., 1989. (Model adjusted to reflect inflation.)

Source: Parsons, 2006.

With respect to job creation, FHWA found nationally in the early 1980s that a $1 million investment in transportation construction would directly generate 10 on-site, full-time construction jobs (person years of employment [PYE]). This number has been adjusted to 5.5 PYE positions to reflect inflation through 2006. When off-site, construction-related and service-industry-related jobs and related increases in consumer demand (direct, indirect, and induced effects) are considered, the total number of full time PYE positions created rises to about 11.0, adjusting for inflation, for each $1 million of highway investment.

Compared with the No-Build Alternative, capital costs for construction of the Build Alternative – Option A would be $140.9 million, exclusive of right-of-way. Option B costs would total $153.8 million. Construction expenditures would generate approximately 800 on-site full-time construction positions (PYE) and 1,600 to 1,700 total positions (PYE), including direct, indirect, and induced, as compared to the No-Build Alternative.

The impact of this direct and indirect employment added to the regional economy would be positive.

3.16.14.2 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

As the impacts are beneficial, no mitigation is proposed.